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FORESTS

AUGUST 1947

50 CENTS





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AMERICAN FORESTS

Published by The American Forestry Association

VOLUME 53

AUGUST, 1947

NUMBER 8

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THE COVER
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Photograph by John Kabel

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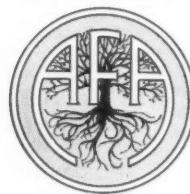
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*The Purpose*

The American Forestry Association is a national organization—educational in character—for the advancement of the intelligent management and use of the country's forests and related resources of soil, water, wildlife and outdoor recreation. Its purpose is (1) to bring about adequate protection and perpetuation of these resources by creating an enlightened public appreciation of the need of conserving them through wise use for the present and future welfare and enjoyment of all the people; (2) to make available to Americans in all walks of life a wider knowledge and appreciation of their forest resources and the part they can play in the social and industrial life of our nation.

The History MORE THAN half a century ago American men and women of vision, stirred by the rapid destruction of forests and forest life in the United States, began to raise their voices in behalf of conservation. Foreseeing the danger of allowing America's rich forests and vast natural wealth to be thoughtlessly wasted, these public-spirited individuals protested the needless destruction that was taking place. Out of their efforts came a collective force—The American Forestry Association, first organized in 1875 and made a national influence in 1882.

The Support FROM AN ORGANIZATION of a few hundred members three decades ago, the Association has attained a substantial membership of many thousand men and women, living in every state in the Union and in foreign countries throughout the world. The funds of the Association are administered by a Board of Directors composed of individuals of national standing—men and women who give their services free, who have a practical understanding of the nation's present-day conservation needs, and are equipped through experience, ability, enthusiasm and training to advance the Association's program.

The Record THUS The American Forestry Association has a long record of efficient public service. The establishment of the United States Forest Service and the creation of the nationwide system of state and national forests and parks were due in no small part to the Association's efforts. Its educational work, extending over more than seventy years, has stimulated public action and built public support for protection against forest fires and floods; for prevention and control of soil erosion; for the development of conservation policies in forest management for continuous production through wise use; for the control of forest insects and diseases and the preservation of fish and wildlife.

The Program BECAUSE OF its independent, non-political character, the work of The American Forestry Association is vitally necessary in the field of public service. It provides an unprejudiced influence for the development of sound conservation measures. It helps coordinate public, state and federal policies. It cooperates closely with federal, state and private agencies in conservation work. At the same time it initiates, sponsors and carries on needed projects in conservation in addition to its regular broad continuous program of education.

MY FAVORITE TREE

By

CORNELIA OTIS SKINNER

Famous Monologist, Actress, Writer



Dorothy Wilding

My favorite tree is a large copper beech. This goes back to memories of my childhood. Where I lived in Bryn Mawr there was a large copper beech on the lawn. It was an immense tree with great luscious branches that came clear down to the ground. I used it as a playhouse and hide-away. I could crawl in under the outer branches and sit in one of the lower limbs having tea with my dolls and nobody could see me. Also, I could climb it with comparative ease and safety. I wish I had one now to serve as a place of refuge in which to get away from the telephone.



"Forestry Is NOT Dead in Germany"

SIR: The May issue of AMERICAN FORESTS (see "Forest Exchange") contained a letter from Dr. C. A. Shenck with the heading "German Forestry Is Dead." Being a German forester, I feel obliged to correct several statements made in that letter because they do not apply to the United States Zone of Germany.

The total stand of stemwood (wood of more than three-inch diameter measured at breast height) in Germany amounted to 360 billion board feet in 1934. By 1946 it amounted to 196 billion board feet and by October 1947, it will amount to 186 billion board feet. The reasons why it diminished by about half its volume are:

An overcut of around 65 billion board feet was made during the 12 years of the Nazi regime; 23 percent of the German forest area was lost by the preliminary fixing of the border in the east of Germany; and overcutting since the end of the war has amounted to 17.5 billion board feet. Germany's war potential of wood has been destroyed for decades, probably for half a century.

However, it is not true "that all victors are anxious to destroy the German forest." American foresters working in the U. S. Zone recognized at once that with nearly all of Germany's heavy industry removed, the German wood economy becomes much more important than it had been before the war—that wood products must help pay for food imports from the United States. Destroying the forests entirely does not mean that only the food industry is affected, but also the mining, paper, pulp, textile and other industries which are needed to rebuild destroyed cities and villages. Worst, perhaps, is that

agriculture also would to a large extent be destroyed so that millions of Germans would starve unless further supported and fed by American and British taxpayers.

So far American foresters have prevented an excessive cut and at the same time have made sure that reforestation of large clearings was started as quickly as possible. Unfortunately, this is not true in the other zones. The table (below) gives a clear picture of the situation.

These figures clearly demonstrate that the forests in the U. S. Zone have been under good management. An excessive overcut had to be carried through in order to meet wood requirements of the Army and UNRRA—for reconstruction and export—and, as no coal was delivered for household use during the winters of 1945-46 and 1946-47, to save 15 million persons from freezing to death. Large quantities of valuable timber had to be used for fuelwood.

Cutting in the U. S. Zone has been under the direction of German forest administration which decided where and how felling could be effected. This resulted in minimum damage. Cutting in the other zones was partially carried on by occupation troops and foreign labor, regardless of the necessities of silviculture. In the U. S. Zone, for example, valuable seed stands, absolutely necessary for carrying on good for-

est management, were preserved. For this and still more, the German forest economy has to be thankful to American foresters.

A comparison of forest conditions in Germany with those of the United States shows that Germany has 22.8 million acres of forest while the United States has 465 million acres. In other words, the German forest acreage is only 4.9 percent of that of the United States, but Germany's 70 million population is one-half that of the United States. The per capita relationship is 3.3 acres for the United States and .3 for Germany. American forests are growing 121 board feet an acre a year, while German forests are producing 308 feet an acre. (U. S. increment figures are based on wood five inches or greater in diameter, German figures on wood three inches or greater.) Under proper production methods United States forests are capable of producing 403 board feet per capita, while the German forests can produce only 100 board feet.

Before the war, Germany needed 250 board feet per capita, and 25 percent of the timber was imported. For years to come Germany will not be able to import wood because of wood shortage on the world market and lack of foreign exchange. On the other hand, the wood requirements of the German economy are much higher than before the war, caused by reparations and reconstruction. Forest destruction in the British and Russian zones has already gone far—and in the French Zone it is under way. Thanks to the economic understanding of the American foresters, in the U. S. Zone the forests are in such shape that a German forest economy still exists, in spite of the heavy sacrifices which were necessary.

It is hoped that the other occupation forces will soon realize that the destruction of German forests means the destruction of German economy as well as of a large part of German agriculture—and consequently the destruction of a great part of the German population unless it becomes a burden on the American taxpayers.—S. F. Graf v. d. Recke, Berlin-Schlachtensee.

Zone	Timber cut 1945-46 (Million board feet)	Percentage of Yearly Growth	Proposed cut 1946-47 (Million board feet)	Percentage of Yearly Growth	Cleared areas Jan. 1947 (acres)	Percentage of Forest Area in Zone
American	4,625	168	5,375	195	371,000	4.5
British	4,250	425	4,050	405	593,000	14.2
Russian	4,700	244	4,500	234	988,000	14.5
French	1,950	144	3,750	278	124,000	3.4
Total	15,525	221	17,675	252	2,076,000	9.1

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Editorial

Fire Prevention, Postwar Style

Except for one item, forest fire statistics for 1946, just released by the U. S. Forest Service, show encouraging progress. As compared with the last prewar five-year average — 1936 to 1940 — the number of fires dropped from 211 thousand to 172 thousand; the area burned was reduced one-third, from 31 million to 21 million acres; and estimated damage of \$33,000,000 for 1946 was \$5,000,000 under the prewar figure. Also, greater efficiency in fire control is written in the record. The average 1946 fire on lands under organized protection burned over but 34 acres, as compared to the prewar average of 45.

With such an encouraging showing it may seem picayunish to single out the next item for a double-barrelled blast — but in view of the present world situation we see in it a trend that is as senseless as it is alarming. This is the revelation that in the short span of 12 months, from 1945 to 1946, the number of man-caused forest fires in this country jumped 40 percent.

Eighty percent more camper fires, 44 percent more smoker fires — that is the story of Mr. and Mrs. America on a vacation spree last year. Fifty-three percent more fires from debris burners — burning in the wrong place at the wrong time — highlights the chapter contributed by farmers and other landowners and operators. Incendiaries, with an increase of 26 percent, were responsible for the greatest number of fires — 19,000 — which is three times the number caused by lightning, nearly four times as many caused by railroads, and fifteen times the number of fires attributed to logging operations.

Somehow we feel that this paradox of cost-conscious people, beating the drums for federal economy and tax relief on the one hand, and on the other indulging in a spree of woods burning that not only robs the federal treasury of millions of dollars but the basic resource wealth of the nation, cannot be passed off simply as postwar reaction.

If, as a press release accompanying the fire report suggests, "millions of

people were in the forests last year for the first time since the war began and probably in many instances forgot previously learned cautions against the fire danger," then something is wrong with our system of fire prevention education — or with the American people. It may be human nature to forget, or to cast aside caution when danger signs are not blazing in neon lights, but it is pretty poor business for a people fresh from the grim realities of modern warfare and whose government is staking their fortunes and their destiny in world leadership.

While education has accomplished a great deal in this country, it is obvious that it has not yet developed a sense of public responsibility for forest fire prevention. Which places new emphasis on Point 3 of The American Forestry Association's Program for American Forestry, calling for the creation of citizen committees in each state to speed up public acceptance of this responsibility.

And judging from the 1946 record of man-caused fires, it cannot come about too soon.

Fifteen Years of Trail Riding

It used to be that when you spoke of the American wilderness only a handful of old-timers, grizzled prospectors and other hardy mountain men could nod their heads in sympathetic understanding. To the great bulk of American people the wilderness was something resurrected from the pages of history, an intangible, glorified something that tied in with the covered wagon and the rampaging of Billy the Kid. And even among those aware that millions of acres of unspoiled hinterland in the back country of national forests and parks were preserved for their enlightenment and enjoyment, few were sufficiently wise in wilderness travel and wilderness living to take advantage of it.

Today all this has changed. These priceless remnants of the primitive are now more fully serving the pur-

poses for which they were reserved. More and more people are becoming conscious of their true values — that their highest public services are rendered through recreation, inspiration and as watersheds. Increasing numbers are experiencing what it means to break with civilization and dwell awhile amidst unspoiled natural beauty. For this achievement, much credit is due The American Forestry Association's Trail Riders of the Wilderness.

Back in 1933 when the Association inaugurated this activity, it had two objectives in mind. One was to provide an inexpensive, organized means by which the average citizen could become acquainted with the wilderness areas reserved for him. The other was to bring him closer to some of the basic concepts of land management. Both objectives have been

realized to a satisfying degree. Wilderness trail riding has developed from a small pioneering party to the 1947 level of nine well organized expeditions — from a scant two dozen participating men and women to nearly 200 a year. In all, approximately 1,500 people, from every state and all walks of life, have taken advantage of this opportunity to revitalize both physically and spiritually, and in the process have developed a deep and lasting appreciation of this resource heritage. Wilderness preservation has thus gained new and valued friends.

There is a moral here that everyone engaged in educational activities might well take to heart. When the average American citizen has tasted of the fruits of enlightened resource management he will support measures to keep these fruits in continued production.

◆ Mendenhall Glacier, Alaska—Photograph by John Kabel



A BANKER LOOKS AT FORESTRY

If bankers can be convinced that a sound program of forestry will aid in the economic and cultural growth of their communities, they will make it succeed, says this official, who backs up his viewpoint with a practical plan of action

By X. L. PELLICER

THE SUCCESS of any bank is measured by the contribution it makes to the cultural betterment and economic growth of the community which it serves.

Officers of banks are generally found in the forefront of any constructive movement that will provide an increasingly better economic livelihood for the citizens of their communities. This does not mean that

bankers are quick to support all ideas and plans presented to them. The reverse is true. Bankers generally move slowly, because they realize that many people look upon them as good business men and will follow their lead.

This places an added responsibility upon the banker, but at the same time makes him an important factor in molding public opinion in support of

worthwhile projects. It is an accepted fact that the country banker's interest in planning and activating sound community programs, plus his influence in controlling the flow of new capital into new enterprises, places him in the position of being the strongest single influence in determining the community's trend of economic development.

The purpose of this article is to suggest that forestry agencies and organizations direct a large part of their educational program toward the bankers of the nation. For if the bankers are convinced that a program of forest development is suitable for their section, they will make it succeed.

What is the banker's stake in forestry? Can he be convinced that forestry will benefit his community? How should he be approached?

Forests are a basic natural renewable resource of the United States. One-third of the land area of the United States is best suited as forest lands. Much of the economic progress of this nation has come from a natural wealth of merchantable timber stands. It will not take much time to convince the local banker in a section of the country where favorable climatic and soil conditions combine to make timber growing profitable, that much of the success which his community has enjoyed in the past has come from the forests, and that with long-range forestry planning the future economic stability of his community can be made bright indeed.

A direct approach to the country



THE AUTHOR is vice-president of the St. Augustine (Florida) National Bank, a forest landowner and, for the past two years, president of the Florida Forest and Park Association.

banker is necessary, but the fact must not be overlooked that many of them take their lead from the big city banker, particularly on subjects that require long-range planning and contain such economic factors as future markets, price fluctuations and over-production.

The most logical approach, in the writer's opinion, is for The American Forestry Association to consult with the American Bankers Association and that they jointly prepare a brochure on forestry that would serve as a handbook for bankers. This book of facts on forestry should tell the complete story, giving reasons why sound forestry practices should be encouraged, and emphasize the profit possibilities. It should contain a blueprint that would be adaptable to every section of the country. The American Bankers Association should be asked to appoint a standing committee on forestry that would assemble facts and pass them on to its membership; the committee should arrange for the publication of articles on forestry in the various banking magazines, and encourage state banking associations to take an active part in the dissemination of information on forestry in their states.

The American Bankers Association should make a study of the credit needs of the forest industry and recommend a relaxing of the present laws prohibiting bank loans on forest lands. In the writer's judgment, this is the crux of the whole situation. If banks were permitted to make loans on forest lands on some safe basis, the interest of bankers in forestry would immediately take on a new meaning.

The writer discussed this matter with the officers of the Federal Reserve Bank of Atlanta some months ago and was pleased to learn that they favored a re-examination of the banking laws pertaining to loans on forest lands. The economist for the bank, Brown R. Rawlings, prepared a splendid article entitled "Farm Forestry in the Sixth District," and it was published in the May issue of their *Monthly Review*. It contains a complete analysis of the forest industry in the South. This is a splendid example of the type of banker's co-operation which the writer believes would sell the public on forest conservation. It will be widely read and quoted by southern bankers and

The banker's interest in forestry would be greatly enhanced if he were permitted to make loans on forest lands, says the author



will make them susceptible to a plan of cooperation such as has been outlined here. The article is so timely and factual that it might be well to quote extensively from it:

"Since about two-thirds of the district's commercial forest lands are in small holdings, tracts of less than 5,000 acres, the small woodland owner has been called the key to better forest management. The most important class of small woodland owners is made up of farmers, who have about one-third the commercial woodland area in their farms. For that reason the improvement of farm woodlands is an important part of any comprehensive forest-improvement program.

"Inadequate farm incomes have long been considered a barrier that must be surmounted before the Sixth District can attain its maximum economic development. Although the district farmers' cash income exclusive of government payments increased on the average from \$560 a year in 1940 to \$1,880 a year in 1946, it is still far below the national average. In great measure this disparity is caused by the small size and the relatively low productivity of most district farms. Since farm-woodland improvement will help maintain the timber industry and will, at the same time, increase farm productivity, better forestry on farms has an especial effect on the district's economic progress.

"Almost 600 thousand district farmers, according to 1945 agricultural census releases, had some woodland on their farms. Less than 10 percent, however, reported any sales of forest products for 1944. Despite its total value of more than \$19,000,000, the per-acre return on forest products sold of about 50 cents was disappointingly low. Though farmers in a sense realized some returns from their woodlands in the form of such home-use products as fence posts, fuelwood, and lumber, if the products so used were given a monetary value, total returns from farm woodlands would still be extremely low. Farm woodlands now produce only about one-third the income they are capable of under good forest management.

Application of Better Forestry—In the long run, farm-woodland improvement will undoubtedly involve activity within all such fields as education, marketing, research, credit, and land tenure. Since the nature and immensity of the task limits the effectiveness of public agencies, its successful performance must depend

largely upon private initiative. Certainly the contribution that farm-woodland improvement can make toward a solution of the district's agricultural problems justifies continuing efforts to make this great natural resource fully productive.

"It is probably the farmers' general lack of appreciation of timber values and income possibilities that is primarily responsible for the inefficient management now practiced. Trees have not been regarded as a crop in the sense that cotton and corn have. In other words, timber harvesting has usually taken the form of clear cutting, or stripping all merchantable trees from the ground at one operation, instead of selective cutting, or the removal of only an amount equal to the annual growth. Where clear cutting is practiced many years must elapse between each harvest. During that time the farmer loses sight of timber values. Therefore he may not realize that he has a valuable timber crop until a forest-products buyer makes him an offer for it. If, on the other hand, the farmer manages his timber stands so as to maintain a productive growing stock from which timber crops may be taken as a regular part of the farm business, he is likely to appreciate the value and income-producing capabilities of his woodlands.

Financing—Credit, which has been called the lifeblood of business, can play an important role in the development of farm woodlands to their maximum productive capacity. The woodland owner's credit needs fall into two general categories—the financing required to rehabilitate unproductive timber stands and the credit necessary to prevent liquidation of stands already productive.

"Much of the district's farm woodland is in such poor condition that a great deal of time will be required to place it on a profitable basis. Tree planting or other means of restocking is necessary in many cases. During the relatively long period that must elapse before returns begin to come in, various costs, such as fire protection, taxes, pruning, and improvement cuttings, will accrue. Often considerable work and cash outlay will be required. The farmer cannot afford to sink cash in an investment that will yield no returns in the immediate future. Pressure for current income may require the utilization of any extra labor in work off the farm rather than on his timber stand, since the latter will yield no immediate labor return. Therefore, in order to extend him the necessary cash

and encourage him to use his extra labor for woodland improvement, credit for forest-land rehabilitation would have to be at low interest rates for long periods.

"Public credit may be necessary in the degree to which legal restrictions prevent commercial banks from providing the credit needed for farm-woodland improvement. Credit regulation and subsidization are now widely used instruments of public policy. Many people advocate their extension to the improvement of farm woodlands. It would seem in any case that the benefits which would accrue in the form of more-nearly adequate timber supplies, soil and water conservation, and reductions of flood hazards, would justify some measure of public subsidization.

"Generally, however, the commercial banks could probably handle credit problems related to such improvement, if they were allowed to do so, better than public agencies could. Woodlands in the district's large pine areas are in a particularly favorable position with regard to the use of commercial credit. In the improvement of stands on most of these woodlands it will not be necessary to start from the beginning. There is already much growing stock which will bring in returns soon after stand improvement is begun. Southern pines grow so rapidly that credit may be needed only for relatively short periods.

"The liquidation of forest growing stock frequently occurs when the pressure of indebtedness or other financial necessity impels the farmer to sell all his merchantable growth in order to get immediate cash returns in the largest amount possible. This conversion of capital values into cash reduces the farm's earning capacity. Stand management on the particular sustained-yield basis that has been found to be most profitable is thus made impossible for many years.

"There are other important considerations which make the action of private lending institutions seem desirable. Farm-woodland-financing problems are closely related to other farm-financing problems. The country bankers, for example, are already familiar with the farmers' credit problems. These private lenders have much valuable knowledge of the prospective borrowers' personal characteristics and an intimate knowledge of community problems. Their experience in handling the farmers' other credit problems would be in-

(Turn to page 377)

WHERE WE STAND IN WOOD WASTE UTILIZATION

By A. D. McKELLAR

IT IS estimated that only one-third of a tree cut for lumber is actually converted into boards, planks and timber—the remaining two-thirds is left in the woods as tops, limbs, high stumps and unmerchantable logs, or at the mill as sawdust, slabs, edgings and other refuse. With an annual lumber production of 34 billion board feet (2.8 billion cubic feet), the yearly waste from logging and lumber manufacturing amounts to 5.7 billion cubic feet.

Similar losses occur in other primary wood industries. Manufacture of lumber into flooring, millwork, furniture and other products involves further waste. The combined losses are conservatively estimated at from eight to ten billion cubic feet a year. In addition, one and a half billion cubic feet are destroyed annually on commercial forest land by fire, diseases, insects, wind and other agencies.

Under present economic conditions, most of this material cannot be utilized at a profit. The big problem is to eliminate waste or convert it into products which can be sold at a price consumers are willing to pay.

A major step is the introduction of new logging methods. With the disappearance of dense stands of large timber in many sections of the country, logging railroads and steam-powered skidders and loaders became obsolete. As a result, a system of tractor skidding and truck hauling has come into general use. Power saws, truck-mounted loaders, and other labor-saving devices have been introduced. The resultant reduction in overhead and labor costs makes possible the harvesting of small or partially defective trees. Even the salvaging of logs from burned forests and re-logging of old areas are profitable in some regions.

Sawmilling technique also is being revamped. An example is the development of improved, high-speed mills capable of being set up in the woods

within a few hours. These mills can be operated effectively in harvesting small timber tracts in selective logging where the timber is of low grade. If used unwisely, however, they may contribute to overcutting.

Many of the larger mills are installing high-speed electrical machinery, requiring little hand labor. The economies effected allow the cutting of small, low-quality logs.

New methods of pulping and new uses for pulp are being discovered, extending the pulping process to many species not heretofore utilized and increasing the consumption of mill waste for pulp. Softwood waste is used by several pulp mills operated in conjunction with sawmills, and a process has been announced for pulping hardwood waste. The latter reportedly can be used profitably by mills with a daily accumulation of less than 30 tons.

Hydraulic barking machines reduce the loss of wood fiber. Some sawmills bark their logs so that the slabs, edgings, and sawdust are better suited for pulping and other uses.

Small pieces of wood can be glued together so that the resulting piece is superior, in many respects, to solid wood. This principle is not new, but a better knowledge of wood structure and behavior and the development of superior adhesives has extended its use. Large beams, arches, keels, propeller blades and many other articles were so constructed during the war.

Ample opportunity for utilizing low-grade material exists. For example, one plant is making flooring by laminating short pieces cut from low-grade logs. Three-ply flooring with a high degree of dimensional stability is produced in any desired length.

Another example is laminated printing rollers for the textile and wallpaper industries. These are usually made of solid wood, seasoned several years to minimize shrinkage and checking. The new rollers are built up of thin boards, seasoned before assembly. Seasoning is done in a few weeks, and any loss is confined to small pieces. Furniture stock and other products could be built up in this fashion.

Most wallboard fiber has been ob-

tained by the reduction of round wood. New methods of manufacture promise a substantial outlet for mill waste. These processes consist, essentially, of the application of pressure, or heat and pressure, to the wood, which may be mixed with a binding agent. The resultant board, especially if moisture resistant and flame-proof, may find wide application in building construction. The same principle of manufacture is used for fuel briquettes.

Many woods have specialized uses because of particular inherent qualities—flexibility, strength, durability, hardness, and so on. Some are little used because they lack the qualities to compete with other species. These characteristics can be imparted to wood in varying degrees. For example, wood treated with urea formaldehyde and heat becomes flexible and can be bent into almost any desired shape. After cooling, it hardens and retains its new form. Other treatments render wood less susceptible to swelling and shrinking, increase its hardness and resistance to abrasive action or attack by fungi and insects, or modify it in other ways. Thus some woods of limited commercial value may become more serviceable.

Wood is composed chiefly of cellulose and lignin. Cellulose is a light colored or colorless material, the principal constituent of the cell walls. Its use in rayon, cellophane, photographic film, and other plastic products is well known. Lignin is normally a dark brown to nearly black substance which holds the cells together. It is used to some extent in plastics, but its principal use is for fuel. Experiments indicate that it might become a more important source of plastics for flooring tile, table tops, and innumerable molded products.

Wood is used also in combination with other plastic materials. Paper is impregnated with synthetic resin and laminated under pressure to form a very dense, shock-resistant material employed in airplane construction. Wood flour is a constituent of linoleum and many other articles.

An outstanding accomplishment is the improved process for producing
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THE AUTHOR is a forest economist attached to the Lumber and Allied Products Division, Office of Domestic Commerce, U. S. Department of Commerce.

Air-herding THE PRONGHORN



When Montana decided to round up surplus antelope for transplanting in greener pastures, Old Paint was discarded for the airplane—and there was action aplenty on the prairie

Winging over the sage-studded prairie, diving and darting like some prehistoric bird of prey, the little two-seated airplane herded the fleet band of antelope. A dive to the right or a sharp turn to the left deftly guided the prairie pronghorns in the direction of a huge antelope trap. And since this was Montana's first attempt to live-trap antelope, every man, from the crew shivering in concealed blinds to the busy occupants of the plane, was tense with expectancy.

A work plan following the general methods used in Texas and Wyoming was being attempted. In its simplest form, it consists of herding antelope

By KEN THOMPSON

into widespread V-shaped wings and then into a corral trap constructed of cord netting. However, dealing with wild animals is never simple, for they are unpredictable.

Trapping operations were decided upon after a state-wide aerial survey of antelope. More than 20,000 of the animals were counted on Montana's prairie range, but the chief discovery was that thousands of acres of former antelope range were depleted. The solution was obvious, if difficult, and the State Fish and Game Commission, having captured elk, mountain sheep, deer and mountain goats, proceeded to lay out a program of trapping and transplanting of this species.

It was accepted that baiting with hay or salt, methods used in attracting other big game, would not prove successful. The alternative was herding, which had been tried in other states with some degree of success. Men on foot, on horses, and in cars had attempted without success to drive these creatures. Only the airplane seemed capable of doing the job.

Practice runs made during the

aerial census had revealed the tendency of the pronghorn to run in a direct line away from a plane. It was also observed that even when running at full tilt, an antelope preferred to go under a fence rather than jump it. So plans were laid accordingly—plans designed to capture these fleet-footed creatures in fair chase on their native prairie.

An area was selected for the operation, one in which the main trap could be concealed and where there was a well established fence that the animals had become accustomed to. This was important for the pronghorns were to be forced along this fence which would form the main arm of the trap wings. Woven wire was stapled for nearly a mile along the fence; and angling away from it to form a "V" was constructed a second slightly shorter one.

At the apex of the V-wings a big corral was built, 100 feet long and 40 feet wide. Heavy cord netting was hung around the enclosure on taut cable so that the captured animals could jump and dash without injury to themselves. A narrow pen was located at the extreme end of the corral where the pronghorns could



be caught and loaded for shipment.

It was into this man-made contrivance that we were herding the antelope—an Indian roundup on a modern plan.

Driving was not easy, and more than once we recalled the words of the old-timer, who had sagely remarked, "You can drive wild animals any place they want to go." The herd leader, a handsome young buck, was striving to lead his charges to safety as the herd turned, doubled, and then continued in a mad dash away from the plane.

Time after time the plane roared to within 10 feet of the ground in order to force the antelope back on the route to the trap. At first the herd responded readily but in time became accustomed to the roar of the motor and turning them was increasingly difficult. Finally they bunched on a hillock and stood defiant, refusing to be moved further. Again and again the plane swooped in low, breath-taking dives, attempting to push the animals into the mouth of the V-shaped wings that now loomed so close. From our position in the zooming ship we could see the members of the ground crew huddled in their blinds.

The pilot mumbled something unintelligible and probably unprintable and shoved the stick forward. Down we went, closer and closer until it seemed we must crash—but only a

slight milling of the herd resulted. One old buck leaped at the plane in anger but no other movement resulted. It was now apparent that new tactics must be employed, so we dug out "paper sack—lime bombs" which had been prepared for such an eventuality. The pilot banked sharply and we laid a pattern of white puffs behind the animals. This started them on their way and we played our ace card—a high pitched siren, sounding like a pack of coyotes. The pronghorns again broke into their distance-devouring gait.

This time they passed the marker that indicated they were running along the woven wire of our long wing. We made a couple of close dives with siren screaming and the herd churned up the ground in their mad dash toward the corral.

Suddenly men rose from camouflaged shelters, a pick-up truck appeared and before we could select a landing spot among the sagebrush and pricklypear, a temporary but sturdy fence appeared, enclosing the animals in a triangular pasture of about three acres.

As the plane rolled to a bumpy halt, we unsnapped our safety belts and ran to lend much-needed aid to the ground crew, who by now had unrolled 90 yards of canvas in preparation for the final phase of the trapping operation.

By this time a dozen ranchers had



arrived in the area and all willingly took a place along the canvas. With a crew of 18 distributed at about five-yard intervals, we moved forward in an attempt to force the herd toward the apex of the wings and into the corral of netting.

We succeeded—but only after a few exciting moments. As we came to the brow of the hillock that had concealed us from the animals, we were directly in the path of the oncoming band that was now trying to retrace its tracks to freedom. By this time the "V" had narrowed to 50 yards and we stood there presenting a wall of flesh and canvas as the only apparent barrier to their freedom. On they came—and just as we were certain we would be trampled, we rippled the canvas and the animals

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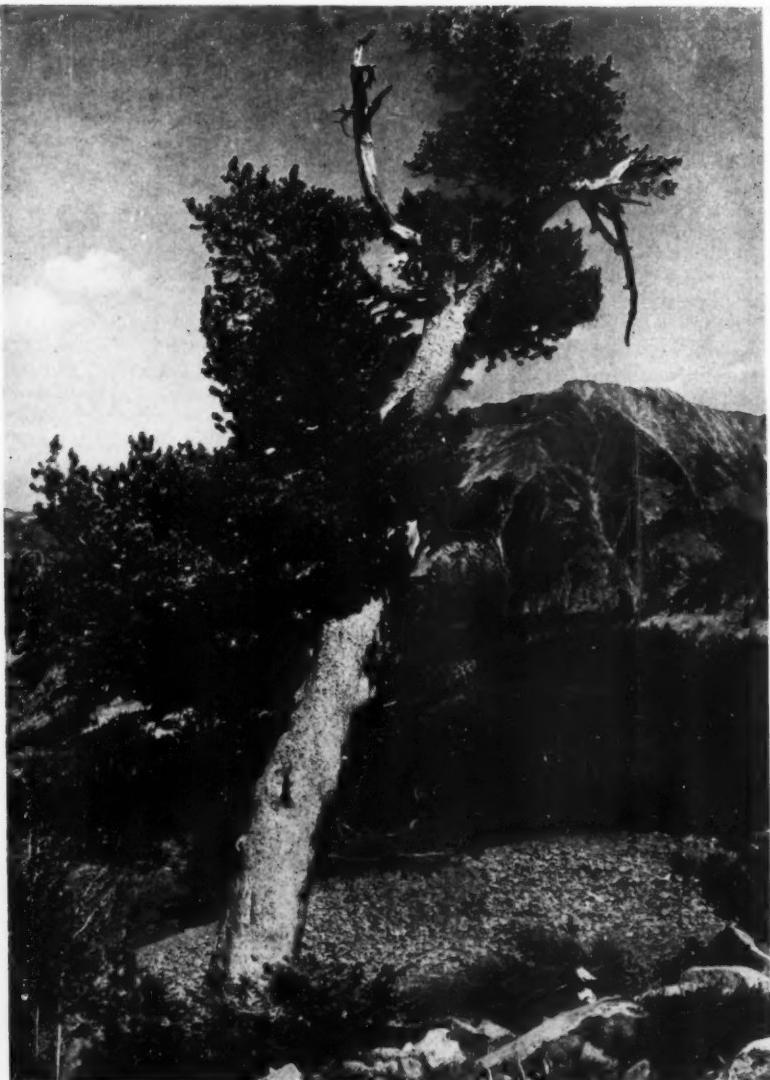
The roaring plane, with siren screaming, sent the pronghorns racing through the V-shaped wing, shown in background, into the corral trap enclosed by cord netting to prevent injury



WHITEBARK PINE— TIMBERLINE TREE

In the harsh environment of the western high country, a tree has to be tough to survive—and few are more tenacious of life, or better equipped for the struggle, than whitebark pine

By CARL and HELEN SHARSMITH



There are few mountain ranges where one can camp so high with such comfort as in the California Sierra. This is partly due to the ideal climate, but veteran high altitude campers also give proper credit to the hospitality offered by one of the hardiest mountaineers of them all—the whitebark pine.

Clumps of this tree form fine shelters from the wind, and deep accumulations of needles make soft mattresses on which to unroll sleeping bags, while the long-dead, dry, resinous wood, in easily manageable chunks, is abundant for campfires.

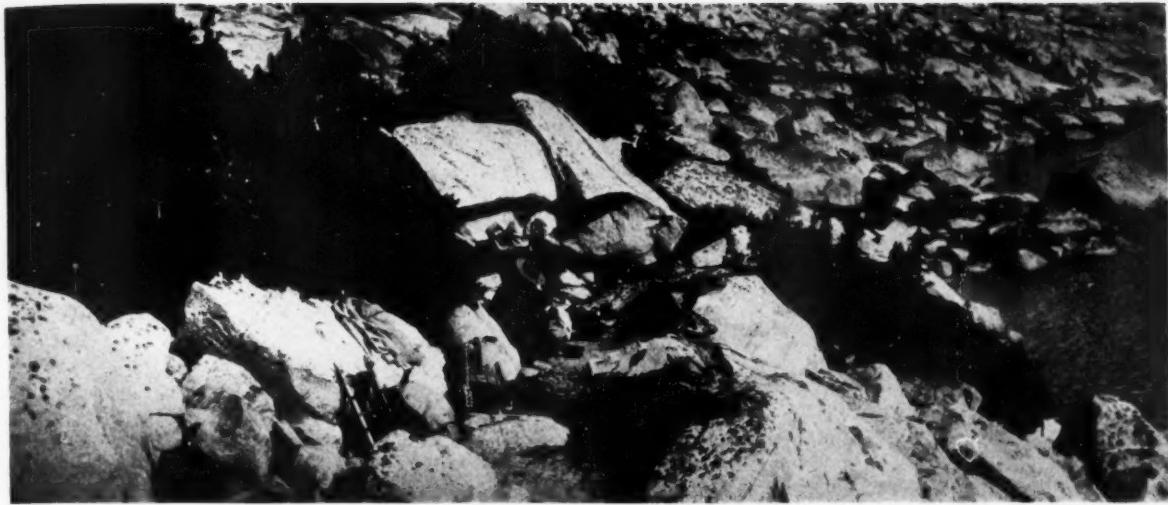
Long ago John Muir said this about whitebark pine: "In detached clumps never touched by fire the fallen needles of centuries of growth make fine elastic mattresses for the weary mountaineer, while the tasseled branches spread a roof over him, and the dead roots, half resin, usually found in abundance, make capital campfires . . ."

It is quite true that fire, the arch enemy of most forests, seldom reaches these trees, the scattered clumps separated and protected as they are by rock fields. Occasionally there is a group upon which a lightning fire has left its devastating mark, but isolation in rocky terrain prevents such fires from spreading. And except in instances of these rare burns, the needles do indeed accumulate undisturbed for centuries beneath the sprawling trunks.

There is a real knack in preparing a place for a sleeping bag in such a hideaway. The experienced mountaineer crawls into a nook beneath the recumbent trunks of the whitebarks and starts digging with his fingers, easily lifting huge chunks of matted dry needles in his hands. In this way he levels out a sizeable area for his bed, and over the solid needle layer at the bottom he crumbles the matted chunks, spreading several inches of loose needles for a finishing touch. On this dry and springy mattress, the Sierran mountaineer can unroll his bag directly, for seldom in these mountains is waterproof covering necessary.

One of nature's hardest products, the whitebark pine has to be tough to survive. Often timberline forests, like their more luxuriant counterparts of lower altitudes, are a mixture of tree species. Sometimes one species predominates; occasionally a single species will claim wide stretches as its exclusive domain. The white-

When sheltered, whitebark pine grows upright



Shelter, bedding and fuel provided by the wind-bent whitebark pines are utilized by the authors at this High Sierra campsite. Their sleeping den is just behind the rock at the left

bark pine is such a species, and the timberline camper cannot mistake a ragged forest of whitebarks when he sees it for the trees have a distinct personality and a typical hard-bitten look due to their constant fight to survive against great odds.

The stout needles of the whitebark occur in bundles of five and persist only near the tips of the branches. The young trees have a remarkably smooth, thin and whitish bark, which has gained for the tree its popular name—and also its Latinized specific name, *albicaulis* (white stem). Also conspicuous is the whitebark's often prostrate or low, bushy habit of growth, the tree under certain conditions being reduced to a dwarfed and misshapen shrub.

Its distinctive cones are deep purple, one to three inches long, and globose, being borne in clusters at the ends of the branchlets and falling to pieces when ripe. The cone scales are very thick toward the apex, ending in a blunt to pointed, prickleless tip, and the seeds are wingless. Cones and seeds quickly mark this tree from the only other five-needed pines whose range it may overlap—the western white pine, limber pine and bristlecone pine.

Whitebark pine is a westerner; it is found nowhere else in the world but the western United States and Canada. Near the Pacific Coast it extends from central British Columbia south through the Cascade Mountains of Washington and Oregon to the Mount Whitney area of the Sierra Nevada in California. In the Rocky Mountains it extends from southern Alberta south to Montana, Idaho and northwestern Wyoming.

At its more northerly limits, where timberline is low, it drops to altitudes of 5,000 to 7,000 feet. More southerly, however, where timberline stretches upward with the peaks, it climbs from about 9,500 feet to an extreme altitude of 11,500 feet. In the north, where timberline forests are frequently composed of many different trees—pines, spruce, fir, larch, hemlock, and cedar—whitebark pine often loses itself among the crowd.

In the Cascades of Oregon, however, it frequently forms pure stands, and in the central Sierra Nevada it is the only timberline tree, holding undisputed claim over large areas. In the southern Sierra it drops out entirely, and the dominant role of tim-

berline tree is taken over by foxtail pine, assisted by limber pine. This situation is duplicated in the Rocky Mountains, where whitebark pine is replaced in the southern Rockies by both bristlecone pine, a very close relative of the Sierran foxtail pine, and limber pine.

What is the secret of whitebark pine that it can exist in an environment that seems to work against life, not with it? As with life itself, the secret is multifaceted and well hidden, yet many of its facies yield individually to prying, and these in part illuminate the whole. Some of the success of the whitebark pine is due to the special physiology of the tree, some to special structural features.

The bark of the whitebark illustrates one such special structural feature. As with all the five-needed pines, cork formation is very late, and the smooth white primary bark (frequently with a purplish tint) persists for a long time—often until the trunk is six to eight inches in diameter. On small branchlets this bark is surprisingly thick, occupying one-half or two-thirds the total diameter of the stem, and containing many big, closely-spaced resin vesicles.

The lubricating effect of the abundant resin is no doubt partly responsible for the great flexibility of the branchlets, of such aid to the tree in withstanding the wind's perpetual buffeting. The branchlets are so flexible that they may often be tied into knots without breaking. This flexibility makes it possible for the tree to accommodate its growth readily to the direction of the prevailing winds.

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Whitebark cones fall to pieces immediately after ripening

How to get along with a DONKEY



By RUTH ELWONGER

Ronald the Recalcitrant was the name of the latest burro of our acquaintance. A highly voluble and spirited donkey, his gregariousness was such that he hankered to join every pack train we met. This led to conflicts, because during the summer of 1946 many people were traveling the high-country trails of the Sierra Nevada in California—either on foot with a donkey or a mule to carry their belongings, or riding and accompanied by long trains of pack horses and mules.

We prefer to recall Ronald's predecessors on earlier—and somewhat happier—trips into the back country of the Sierra. The summer before, we spent a two-week vacation with Wildflower, whose only fault was her habit of collecting in her own way every plant we were about to add to our own botanical collection. Before that there was Bronco whose barring across the shoulders and legs indicated the relationship of all donkeys, wild or domesticated, to the true zebra of Africa. His companion was Dusty whose passion for dust baths exceeded that of any other member of the donkey tribe we have known, although all donkeys like to roll at the end of the day's work. We have also learned about donkeys from Nellie, Blackie, Pinkie and Philip—perhaps a dozen in all.

With their help in carrying our food and personal equipment, another woman and I traveled the high trails of one of our finest remaining wilderness areas—the back country of Yosemite, Kings Canyon, and Sequoia national parks. Though fairly strenuous, travel with a donkey is less laborious than knapsacking. It is in-

expensive, for donkeys complete with pack equipment can be rented for around \$1.50 a day at stables in these parks and at the terminus of most roads in adjoining national forests. Pack mules and horses are also available, but most packers will not permit you to take this stock out without a guide.

There are many reasons for this. Mules and horses require experienced packing and care. Carrying heavier loads than donkeys, the danger of injury to their backs is greater. Donkeys can be staked out at night, but mules and horses must be hobbled, and unless you have stopped where there is suitable pasture, they are likely to wander far during the night in search of food. A donkey can crop the short grass of above-timberline meadows, but a horse or mule must have either supplementary feed or the longer grass of lower elevations.

The donkey is the most sure-footed of pack animals—and the best climber. Contrary to his reputation for stupidity, he is intelligent—more intelligent than a horse, animal psychologists have found. We had suspected this fact before hearing these estimates of donkey I.Q. At any rate, as trail-finders they have frequently outdone us. Our burro would refuse to continue in the direction the trail apparently lay. This usually happened where the trail was obscure—for instance, where it crossed an expanse of smooth granite or a meadow honeycombed by innumerable trickles of water under any of which the trail might lie. Our efforts to make him budge would only result in his planting his four feet wide apart,

bracing his legs, and rolling his eyes up and back. At such a juncture, we finally learned to turn our attention from donkey to trail. Once we found it turning at a sharp angle and disappearing under overhanging bushes. Another time it made an unexpected switchback up the slope. When we were properly back on the trail, our donkey metamorphosed into a moving and docile object.

Despite his unperturbable expression, he is alert. A prick of the ears, a fixed stare up the hillside often indicated to us—if we were quick enough—a cinnamon-colored bear lumbering hurriedly up the bank, or a doe resting in the partly burned out base of a giant sequoia, or some other animal our own senses had failed to detect.

Burros rented in the national parks of the Sierra Nevada are accustomed to fording streams. But donkeys are natively animals of semi-arid regions and when crossing boggy or marshy places pick their way carefully. Their dislike for wet places is not unreasonable, because all four of their hoofs, unlike those of a horse, are small and narrow and sink readily.

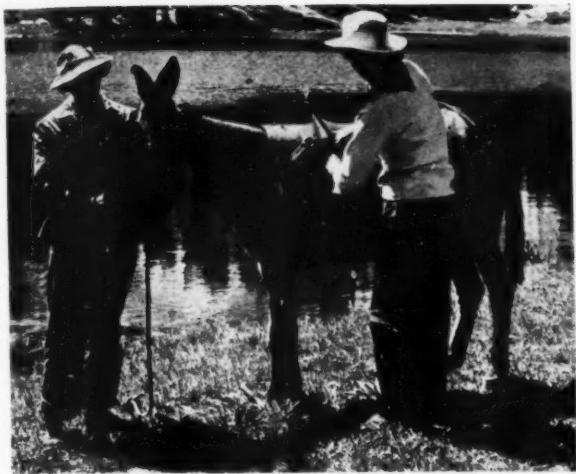
In planning a burro trip, points to remember are as follows:

1. Do not overload your burro. The maximum load on mountain trails, exclusive of pack equipment, is 75 pounds. It is necessary to plan your outfit carefully in advance and reserve enough burros to handle your equipment. The problem of cutting down on weight at the last moment (the packer will weigh your outfit) usually resolves itself into many anguished "I can't do without that"'s on the part of each member of the party.

It is best to have the sort of equipment you would take if knapsacking. We use down sleepingbags, a 56-ounce waterproof tent of neoprene;

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There's nothing dull about a donkey. He may have his little idiosyncrasies but his IQ is high and the savvy he displays on a wilderness trip proves it. Take Ronald, for example



1 In packing, author first puts on blanket and saddle, cinches with latigo hitch



2 Next, well-balanced kyacks devoid of sharp edges are swung on, offside first



3 Dunnage bags, containing sleeping bags and extra clothing, are buckled on kyacks



4 Square of canvas goes over pack, which is made secure by Squaw or Diamond hitch



5 Now, a twist of the wrist and a bit of fancy foot work, and the pack is all set



6 Ready for the day's work. The donkey's top speed is around two miles an hour

PROGRESSIVE FOREST FARMING

By CHARLES R. ROSS

County Agent Bob Griffith is sometimes heard to claim that Perry County has the best example of farm forestry in Alabama. A county agent naturally takes pride in work in which he has personally aided. But after allowances are made for that, it can still be said that he is backing a strong contender in the Webb farm.

Forestry at the Webb place is something to be enthusiastic over. Located about five miles west of the county seat of Marion, it includes over 20,000 acres. This is an unusually large farm ownership. But in the Deep South, large ownerships—without reference to the large aggregations of timber industry and the federal government—are still firmly established over a land they once dominated. Some places have little or no farming, being mostly woodland. A name that is as good as any to designate this general class of large properties—say a thousand acres or more—is "plantation." While the term has probably wandered from the earlier definition, it has a romantic connotation and remains in wide use from eastern Virginia to eastern Texas.

Half of the Webb plantation, or

10,000 acres, is woods. Each year there is hauled from these woods 1,500,000 feet of lumber—750 truck-loads—a harvest that is expected to continue indefinitely without decline. Thick stands of loblolly pine, good harvesting methods, well organized fire protection—all this the Webbs have. And they have something more—something invaluable in farm forestry. Woods work has been closely dovetailed with a full schedule of exacting farm operations. It is organized to take up the slack that, because of the nature of their crops, settles down on most southern farms with blighting weight for several months of the year.

The Webbs have not only given forestry a "place"—which increasing number of landowners are doing—they have also given it a "time." There is a regular time each year to go to the woods with ax and saw and truck. It comes up on the calendar just as regularly as the time for breaking land or planting cotton. The Webbs have seen a way to get extra income from their timber by reason of being able to offer farm laborers and tenants employment for 12 months instead of nine. It means

the difference between having enough labor to harvest cotton and potatoes, or not having it. Sell all their merchantable timber at one time? "Not for us," says Jake Webb, "we need that work for our tenants."

The Webbs are so constituted that they can break away from traditional systems of handling timber—and of doing other farm jobs. Perhaps that's why, as the county agent says, their farm production per acre is twice that of the county as a whole.

Charles and Jake Webb are so hospitable and appear so easy mannered that a visitor may not realize from first impressions that they follow their farm business as closely as the Canadian mountie is reputed to follow his quarry. Any storybook notion of the dignified plantation owner riding about giving directions with a cane, would be inappropriate here. The Webb brothers, clad in work clothes, are as likely to be found in the feed lot with their calves, or giving first aid to a tractor, as anywhere else. Other members of the family share in ownership and one sister, Mary, keeps books. But Charles and Jake are in the driver's seat.

They have their hands full. Farm diversification is advocated as a good thing, but it does not simplify the management end. This plantation seems to go the limit in diversification. In a typical year it will have 10 major crops led by 750 bales of cotton, 50,000 bushels of corn, 11,000 bushels of potatoes, 10,000 bushels of oats, and a good lot of hay. Nine tractors and 160 mules and horses are used in cultivating more than 6,000 acres. Livestock and timber are very much in the picture, too.

One hundred families of share-croppers and tenants work all or part time on the Webb lands. Incidentally, bookkeeping for this population is not the least chore on the plantation. Corn-hog farming in Illinois, wheat farming in Kansas, and dairy farming in Wisconsin typify the nation's big farming businesses, but their operators do not have to watch nearly so many switches and dials, so to speak, as do the harried bosses of big multi-crop southern plantations.



Jake and Charlie Webb at their plantation mill, ready to move it to a new site on their farm-forestry domain

This comparison is made by way of according due credit to the comparatively few highly organized plantations, and of course, to their operators.

The Webbs are comparable to expert ringmasters presiding over a seven-ring circus. All seven rings are going top speed in the fall, the season for harvesting nearly all the crops. They have a saying in Perry County that if a man dies during this rush season time cannot be spared for a funeral. His body is stored on ice and the funeral held later.

When the chill winds of November are tugging at russet oak leaves, the cotton, peanut, corn and potato harvests will be done. There is still work, of course—with the livestock, fall grains and a multitude of little jobs. But not enough work to keep busy the scores of hands that were deployed across the fields earlier in the fall and in the spring. The matter of providing year-round employment can be a critical one for the plantation set-up. It depends entirely on hired or share labor. With the small "family farm," which the government is encouraging, it is a different matter. Labor is absolutely pre-eminent on the big place. An understanding of this is the best key to owner viewpoint these days. An outstanding farm economist recently discoursed on the importance of timber on southern farms. He didn't talk about the income to be made, but about the possibilities of rounding out full-year employment.

Cotton, cattle and timber comprise the big three among Webb farm activities. Preparations for the timber harvest begin toward the end of November. The plantation has its own portable sawmill. Locations for the mill are selected in line with a general plan for cutting in the more mature tracts. The woodlands are not in a continuous block, although two tracts have over 2,000 acres each. While the mill is being set up, woods crews begin the felling of pine, oak, gum and poplar. Direction of the felling is in the hands of a young man trained by the Webbs. He takes the larger trees and those in poor condition. Foresters from a number of agencies, particularly the Soil Conservation Service, have spent much time obtaining volume and growth data to aid the Webbs in a sound harvest plan. General policy recommendations have been followed, but no elaborate system has resulted. The aim is an average cut which will not exceed the growth. There is left an ample number of desirable trees to



Soil Conservation Service

The Webb's pine heritage provides an annual harvest of 1,500,000 board feet and slack time work for farm labor

provide for reseeding and for another good cutting in 10 to 15 years.

The Webb woods look good. Foresters who visit their cuttings agree on this, although differences may be voiced as to the system of selecting the trees to be cut. As the visitor rides over winding country roads noting with appreciative eyes the long, deeply wooded hills so clearly expressive of rural charm as well as a rich husbandry from a good earth, he is apt to think of a personality no longer here, but who unmistakably had a part in it. The father of the Webbs gave much thought to his

woods. Over the years he had watched the pines grow. It is all second growth, the older stands originating from the cotton fields left idle in the reconstruction period. He did little cutting, although he could have "saw-milled" his entire holdings in his latter years and had a fortune in his hands. His sons and daughters freely acknowledge their debt to him. He left them something with which to work. You can't have a thriving balanced timber program when your woods have been cut everywhere and your best timber is in small sizes. Most plantations, unfortunately, are

Farm forestry has been given a "place" and a "time" on the 20,000-acre Webb plantation thereby providing the backbone for year-round employment for approximately 100 families

in a cutover condition and they cannot at once move into such remunerative and interesting forestry operations. However, the lately arrived pulpwood market has hastened the day for many of them.

Sawmilling goes on all winter at the Webb plantation. Normally 20 to 30 men are employed in the timber harvest. The lumber is stacked at each set and sold by the whole lot, or yard. This has proved a profitable system. While obtaining maximum labor income for Webb hands, it is simple and solves for both buyer and seller the problem of satisfactory measurement of the product.

As war demands for lumber became more acute there was pressure upon the Webbs to exceed their cutting plan and throw more timber upon the market by selling it to other sawmills. As a result, they cut heavier themselves and in addition sold a great many high grade long piling, in special demand for war facilities. One lot of piling cut in 1945 averaged 97 feet—the largest said to have been delivered to Mobile in many years.

Over the far-flung yellow pine empire, pines have a much greater all-round value than the hardwoods on typical pine sites. The Webb lands are located in the hilly midlands of the South where there is, with good cause, mounting concern over the increase in hardwoods at the expense of pine. But, it is a good bet that the incipient hardwood threat will be met with the same sound practices the Webbs apply to all their farm work. Hardwoods that can be sold are cut for logs. With 500 persons on the plantation—tenants and their families—who have to cook the year round and keep warm in winter, hundreds of cords of fuelwood can be removed yearly. This helps portions of the woods located near the tenant homes. Speaking of tenant wood cutting, Jake Webb says, "We have the best bunch you ever saw when it comes to saving our good trees."

A lot of fuelwood is also used at their cotton gin (another labor provider) which is powered by a wood-burning steam unit. But since both tenant houses and the gin get much fuelwood from slabs and tops left after sawmilling, the removal of culms for firewood is not as heavy as it might be. Like woods owners everywhere, this plantation needs help from research, and it can be hoped the pulp mills will someday take all kinds of wood.

Speaking of pulpwood, the Webbs have considered this market, but have moved very little in that direction. The quality of their pine for lumber,

and the fact they have a sawmill to feed, lessen the attractiveness of the pulpwood market in their case.

There is a planting program. For the past several years, 150 to 200 acres have been planted to pines each year. Plantings have been mostly in scrub hardwood and plum thicket areas.

Without the sharecroppers and tenants whose houses are dotted over field and forest, the plantation would not be the productive unit that it is. So far, a labor shortage has not been experienced, although many of the farms in the section have been crying to high heaven over their plight. The fact that most hands stuck through the war is testimony that work conditions and rewards are above average. When asked about tenant earnings, Jake Webb said, "I believe it is fair to mention the good workers rather than talk about the average. We have both renters and sharecroppers. The renters pull down our average. We have little direction over their farming. With the sharecroppers it is different. They are partners with the landlord and the landlord directs their farming. The sharecroppers do much better. Still, the pro rata production of all our hands will probably run twice the average of other farm workers in the county."

Jake then opened one of the ledgers and read the production figures for Boyd Lopsley, a Negro sharecropper who was highest the preceding year: 25 bales of cotton, 500 bushels of corn, 200 bushels of potatoes, an ample quantity of sorghum syrup. He had a good-size family and kept three milk cows, selling several calves. Other production would include such items as hogs, chickens, eggs, many foods from the home garden, fruits and nuts. This sharecropper's own cash income from farming was over \$2,000 on 1944 prices. In addition, he had the equivalent of about \$1,000 in milk, meat, vegetables and other food which he grew and did not have to buy.

Sharecroppers are referred to as "halfers." The landlord gets half their production of three crops: cotton, corn, and syrup. Income from calves, chickens, potatoes, butter and other items are the cropper's. The landlord furnishes house, garden, pasture and fuelwood for the "halfer," and everything that goes into the share crops except labor and half the fertilizer.

It is readily seen that the landlord thrives when the sharecropper thrives. A hand like Lopsley is a great asset. Money may be lost on lazy or incapable croppers. Charlie Curry was

another hard working sharecropper. Records for a recent year showed that he raised only 12 bales of cotton, from which his share was about \$750 cash income. However, he kept a good flock of chickens, sold some pigs and killed about 600 pounds of meat for his own use. His cash income from farming was around \$1,200 on 1944 prices. Later price conditions would raise all these income figures considerably, cotton prices having almost doubled.

These and other figures from the Webb's ledger make it clear that on efficient plantations the sharecropper can earn a fair living if he exerts efforts comparable to those required of factory workers. Nor is the cropper's nose held to the grindstone all the time. Said Jake Webb, "They average three months of 'their time' each year, after crops are gathered at the end of October." There are occasional days, too, during the crop season when weather prevents farm work. For slack season and slack days the Webbs come forward with the attractive feature of full employment in woods or sawmill activities, or in a number of miscellaneous jobs such as fence repair and construction work. Most of the hands, for one reason or another, are not as capable with their crops as the two mentioned. They require other employment.

Farm mechanization is on the march over Dixie. The Webbs realize that they have too many mules, and they plan for more tractors. However, they must move slowly, because the Negro cropper seems to work better with a "personal crop," and many would leave if they could not have a mule to tend their own crops. It is inevitable, however, that the new farm machinery being perfected for southern crops will reduce the worker population on plantations. Here we glimpse the basic force behind one of the biggest migrations known to this continent.

The government has helped tens of thousands of tenant farmers to locate and finance their own farms. Many have left for work other than farming, as jobs have been obtainable in towns and cities. Yet it is proved that efficient far-sighted landlords like the Webbs can offer the landless farmer considerable opportunity.

The Webb plantation is an outstanding farm. Hundreds of acres of natural grasslands support a large herd of purebred Hereford cattle. Bulls are furnished for cattlemen all over the South, and baby beefeves for 4-H clubs and FFA chapters. Cotton is grown on 1,300 acres. There

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RADAR AND FIRE WEATHER

By A. G. HALL

RADAR, the war-born magic which enabled pilots to fly blind, which helped spell the doom of submarine warfare and which provided the eyes of defense, may soon play an important part in forest fire control.

This newcomer to the fire front will not prevent forest fires nor will it put them out, but it bids fair to serve the fire-fighting forces indirectly—as an aid in forecasting fire weather. Half the forest fire battle is fought if the control organization knows when and where to expect trouble and is able to marshal its strength within quick striking distance.

Lightning fires are not a major menace in the East, but in certain parts of the West, particularly in the Northwest, they often account for from 50 to 60 percent or more of the annual burn. Storms advancing rapidly and unpredictably over wide expanses of forest land have been known to set as many as 500 fires in one day's travel. Generally the lightning strikes in remote areas, difficult or impossible to reach with mechanized equipment and hours or often days away for men on horse or afoot. Even when aircraft and "smoke-jumpers"—the paratroopers of the fire-fighting forces—are called into action, the elapsed time is often great enough to result in a costly and dangerous fire. This is especially true when lightning strikes unexpectedly.

Studies of the occurrence of lightning storms have revealed no set patterns. It cannot be anticipated that because two previous storms have followed a particular sky path across a state or region that the next, or any other for that matter, will follow the same route. Atmospheric conditions and air currents unrecorded on the observer's data deflect the storms and buffet them around the heavens to the confusion of men on the ground.

It is hoped—yes, expected—that radar in the hands of properly trained operators will be able to "see" a storm during its inception and keep it under "observation" until it has blown itself to sea or has otherwise been eliminated as a fire danger source.

The U. S. Weather Bureau is now experimenting with radar at the Washington, D. C., airport where it is able to pick up approaching storms within an efficient operating radius of from 100 to 200 miles. Two more establishments are being planned for Kansas and Nebraska—where the magic eye will keep tabs on thunderstorms and tornadoes. A third installation is planned for the Seattle, Washington, area; and it is in this

depends upon the size of the droplets in the storm field. Very tiny droplets produce no discernible reflection, but once the droplets reach a certain size, the radar operator has a pattern before him which his trained eye can translate. With radar stations established so that large areas are covered by two or more instruments, it will be possible by use of triangulation methods to place storms exactly as to position and speed and direction of travel.

Radar, however, cannot be purchased and installed as cheaply as can fire observation towers. It is expensive—about \$500,000 for each set-up—and requires a large staff of specially trained men. Radar for forest fire weather forecasting alone would be a super-expensive luxury. But the dreams of fire control men are not based on radar's use in fire control alone. There are sufficient other beneficiaries to warrant the federal government's continued experimentation with radar and its ultimate establishment as a common adjunct to the Weather Bureau's scientific equipment.

The Army and Navy need radar installations for use of their aircraft, for national defense measures and for the training of men. Commercial aviation will benefit. As Representative Horan, of Washington, pointed out when radar was being discussed with the fire control item during the hearing on the Department of Agriculture budget, "Do not forget that we are building up in the present budget over \$100,000,000 for aviation progress, which will require radar, too. This is all a matter of joining forces and getting cooperation between interested parties."

Dr. Reichelderfer, chief of the Weather Bureau had this to say about the practicability of radar, and it holds justifiable hopes for those interested in fire control: "From what we know of radar now, a mountain station would be particularly useful. It gives radar greater range; radar is a line-of-sight proposition, as you know, and it could spot severe thunderstorms far away. The Forest Service people could be notified and make their plans accordingly."

MAN-CAUSED FIRES INCREASE

A 40 percent jump in the number of man-caused forest fires during 1946 is reported by the U. S. Forest Service. Greater public use of the forests for recreation is given as the primary cause of this increase. For example, 55 million people visited the national forests last year as against 24 million in 1945.

However, the number of fires from all causes—172 thousand—was considerably under the five-year average from 1936 to 1940. During this period 211 thousand fires burned every year. Also, the acreage burned was less. 1946 fires burned over 21 million acres, causing a loss of timber and improvements estimated at \$32,000,000. From 1936 to 1940 the average yearly burn was 31 million acres, the average annual loss nearly \$38,000,000.

On forest land under protection, main causes of fire were listed in the following order: incendiary, smokers, debris burning, lightning, railroads, campers and lumbering. There were 26 percent more incendiary fires in 1946 than in 1945, 80 percent more camper fires, 44 percent more smoker fires and 53 percent more fires from debris burning.

area that radar will be used in forest fire control.

On flat land installations such as at Washington, D. C., and in Kansas and Nebraska, radar's effectiveness is limited to probably not more than 200 miles. Like the human eye, this "magic eye" depends upon line-of-sight, and regardless of its sensitivity and far-sightedness it cannot see around the curvature of the earth. Mountain locations, such as will be most useful in forest fire weather forecasting, will increase radar's sight range.

Radar's ability to locate a storm

HARVARD MODELS

Masterpieces of exactness, these unique models of the New England scene represent forestry education in its most artistic form. You will want to see them when you visit the Harvard Forest at Petersham

By HENRY S. KERNAN



1740—After settlement, forest land was cleared for crops
1830—Below, same area at highest peak of farm development

Anyone travelling by car in central Massachusetts will find a visit to the Harvard Forest at Petersham repaid by a keener appreciation of the New England scene. Back and forth across this land have passed the tides of American history. Each has left a trace upon a landscape whose charm and fascination have been felt by everyone acquainted with it.

To illustrate the response of New England's land and forests to the social and economic forces that shaped America, there are on display in the Fisher Museum at Petersham the now famous Harvard Models. There are 23 in all; and with one exception they are exhibited in cases six feet wide, three feet deep, and three feet high. The scale varies, being largest at the front and smallest at the rear in order to convey the proper perspective. Most commonly the frontal scale is one inch to one-and-a-half or two feet.

The scenes were largely designed by the late Richard T. Fisher, director of the Harvard Forest for many years, and in whose memory the Fisher Museum was established in 1941. They were executed in a Cambridge studio over a period of 10 years and are masterpieces of exactitude and skill. Moreover, they represent a type of forestry education that is artistic and dramatic without being obscure or puerile.

In many ways the most striking of the models is of a scene on the edge of Harvard Pond near Petersham where, until the hurricane of 1938, stood a remnant of the primeval forest as the pioneers found it upon their first visits to Nichewaug (as Petersham was then called) in 1740. There were giant pines and hemlocks, 150 feet high, and between them majestic hardwoods. Underneath was the dank, spongy forest floor built up through untold centuries by decaying leaf mold. The old trees are gone now; but something of their majesty can still be felt as one gazes upon the model constructed with such perfection of minute detail.

The series continues with a scene of the pioneering days when farms were nearly self-sufficient and only a minimum of land was cleared for the needs of the family unit. Livestock grazed in the natural meadows, and the only cash crop was potash made by burning logs too big and cumbersome for any other use. The forest still dominated the landscape and seemed inexhaustible.

By 1830, the date of the next set
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1850—The beginning of farm abandonment, with trees pushing back into previously cleared fields. Industrialization and western migration contributed heavily to the downfall of many small farms



1910—The return of the forest. Logging white pine which gradually seeded into the old fields
1930—After the pines, hardwoods came in forming the pattern of New England's forests today



Granite State Woodlands



Because of the state's position as a vacation land, every acre of woodland has value for the people of New Hampshire. This view of the Presidential Range is typical of Granite State scenery

In shape, New Hampshire is a right triangle the base of which rests upon Massachusetts while its perpendicular side reaches northward from the Atlantic shore to Canada. The Connecticut River is its hypotenuse, except at the northern end, where the Canadian boundary serves.

Because of 50 miles or thereabouts of ocean frontage New Hampshire ranks as a maritime state. More important, by reason of a magnificent assortment of mountains, lakes, rivers and seashore, decked with green trees, it can offer just about every known form of outdoor recreation.

The state's land area is reported by the 1940 Census as about 5,775,000 acres, and of this 4,672,000 acres is now forested. Farm land stands at

723,000 acres, while pasture and other types of land use account for 380,000 acres. In addition to the woodland, most of which is susceptible of management for commercial wood production, 40,000 acres of mountain tops and steep slopes are regarded as chiefly valuable for protection.

Every acre of woodland has value for the people of New Hampshire, by reason of the state's position as a vacation land. Dwellers in crowded cities along the eastern coast from Portland, Maine, to the District of Columbia, flock to its green valleys and rugged hills in summer. This

has been going on for about three-quarters of a century. In recent years a younger element among such townspeople has acquired the habit of going to the White Mountains in winter, too. The residents of the playground areas furnish food, lodging and reasonable opportunity for enjoyment, for a price. It is all a long established, economically sound, and mutually satisfactory business.

Like the other New England states, New Hampshire has always been wooded. Three hundred years ago there were few openings anywhere except over rivers and lakes. When Rogers' Rangers straggled back along the Connecticut River, after burning the Indian village of St. Francis, they traveled through unbroken forest ex-

By JOHN B. WOODS

cept when crossing the "cohoes" or intervals, which apparently existed then in the vicinity of the present towns of Lancaster and Monroe. Except for a few such prairies, and the considerable acreage of many large ponds and lakes, the state offered early settlers the challenge of clearing before they could farm.

The challenge was accepted. Settlement began in the seventeenth century along the coast and adjacent to the Massachusetts Bay towns, and gradually pushed west and north. By 1800, most of the land had been taken up and thousands of productive farms filled the stream bottoms and spread upon the slopes of the lower hills. Historical records show that a century ago nearly 2,500,000 acres had been cleared for tillage and upland pasture south of the White Mountains. However, settlement was less widespread in the northern portions of Carroll and Grafton counties and in northernmost Coos.

Such mountains as those of the Presidential Range resisted clearing and cultivation until railroads had been pushed in from the seaboard. In the extreme northern end of the state where the Androscoggin and Connecticut rivers have their sources, splendid forests of spruce, fir, white pine and hardwoods awaited the coming of lumbermen until late in the nineteenth century.

When the owners of these timber tracts began to operate, the methods used were those of the North Woods of Maine—winter logging and stream driving in the spring. Sawmills at Rumford and other points on the Androscoggin and far down the Connecticut, at Mt. Tom in Massachusetts, were fed by the giant long log drives, which left the cuttings when the ice went out in March and surged downstream with the snow water until most of the logs finally were safely boomed at the several mills.

Youngsters of that day and region—and the writer is happy to have been one of them—made it their business to know exactly what was happening upon each of these driven rivers. Day by day, at school in late March, along the upper Connecticut, we heard via grapevine telegraph that the Van Dyke "wangan" was at North Stratford, or Lancaster, or by the devilish shoals at Upper Waterford, where the logs always jammed. We learned, too, who was in charge of the crew of wild Canucks, 12 spans

New Hampshire, almost solidly wooded in the days of Rogers' Rangers, suffered grievous floods following heavy cutting around the turn of the century, and launched a notable program

of horses and six bateaux. And naturally we always managed at least one visit to the tent camp in some farmer's meadow, where a good natured cook passed out beans garnished with baked fat pork, cream of tartar biscuits and hot gingerbread, the whole washed down with strong tea.

A week or two later another crew of moppers-up, called the "rear," would come downstream, pushing stranded logs into the rapidly receding freshet. Nothing more would be seen of the drive until late summer, when a dozen blue painted wagons, piled high with nested bateaux, camp gear and groceries, and pulled by four-up teams of broad-beamed western horses, would come up river on their way back to the North Woods.

The last of the long log drives went down 30 to 40 years ago. Then followed an era of cutting smaller timber, mostly spruce, balsam fir and poplar, for the pulp mills of northern New Hampshire, Vermont and Maine.

In time these supplies began to wear thin, both in large ownerships and farm woodlots, and today the pulp makers are desperately trying to expand their use of the more plentiful hardwoods.

At about the turn of the century the effects of widespread removal of mountain forests began to be apparent. Normally well behaved rivers ran wild, ruining meadows and wrecking villages. In 1901, Governor Frank W. Rollins founded the Society for the Protection of New Hampshire Forests, to work for preservation of forests and watersheds through public ownership of forest lands in the White Mountains and scenic areas throughout the state.

The next year he was joined by Philip W. Ayers, who served as executive forester for 33 fruitful years. Under his leadership the organization, with more than 2,000 members in a score of states, made a truly notable record. Public sentiment was aroused in New England and in 1903 the

Walter R. Merryman



Familiar scene in New Hampshire thirty years ago—the start of a spring log drive or "run"

New Hampshire legislature memorialized the Congress, asking for preservation of the scenic beauties of the White Mountains through federal acquisition. In time the Weeks Law was enacted and the national forest system came east.

Crawford and Franconia Notch areas were acquired along with nine or ten smaller reserves, with the society's assistance, for eventual state ownership. The organization has led a strong movement for acquisition of similar reservations by towns. Such activities emphasize the importance of forests in the New Hampshire economy. They serve as playgrounds and as sources of the water supply of nearly every village and city in the state.

According to the latest survey by Henry I. Baldwin, research forester of the state service, the 4,671,693 acres of forest land in New Hampshire is owned as follows:

Federal (including 649,000 acres of national forests), 657,000 acres; state (including college, water-board, etc.), 55,628 acres; counties, 3,925 acres; towns, 52,502 acres; semi-public (institutional), 11,921 acres; farmers, 1,086,000 acres; industry and other, 2,804,717 acres.

One third of this area bears sawtimber, while nearly another third supports stands of pole timber size. Slightly more than 1,100,000 acres is classed as being predominantly seedling and sapling areas, while 625,000 acres is poorly stocked with small trees or deforested, a considerable part of it recently cutover.

Of commercial sawtimber there is estimated to be 7,610,000,000 board feet, of which 3,424,000,000 board feet is softwoods (2,055,000,000 feet spruce and fir; 951,000,000 feet white and Norway pine; 304,000,000 feet hemlock; 70,000,000 feet others), while hardwoods amount to 4,186,000,000 board feet (3,882,000,000 feet birch-beech-maple; 114,000,000 feet cottonwood-aspen; 76,000,000 feet oaks; 114,000,000 feet others). The volume of pole-size timber including material from tops and limbs of sawlogs, where usable, is estimated as 13,579,000 cords of softwoods and 24,512,000 cords of hardwoods.

The record of forestry for timber production is not impressive. For as much as 40 years there has been conscious effort by many individuals and agencies to interest landowners and city dwellers in proper management of woodlands.

A great many plantations have been set out and hundreds of forest owners have pointed with pride to their woodlots. In fact, visitors have long re-

ported that this state presented a well-nigh optimum picture of American forestry. Yet when the 1938 hurricane blew down plantations and broke off the larger trees in older natural stands, it became apparent that most of the trees in these forests were of poor quality.

In general the woodlands of New Hampshire suffer from extremes; either they are neglected and allowed to grow like Topsy, or they are cut too early and so prevented from maximum yields of wood or value. Most of the private woodlands in large ownerships and many farm lots are cut too closely, while national forest stands and a considerable portion of absentee ownerships are not managed as closely as might be desirable, considering their status as object lessons in management.

The estimated yearly growth in sawtimber trees amounts to 389,000,000 board feet, while pole timber growth is 1,230,000 cords. The division between softwoods and hardwoods is 174,000,000 board feet vs. 215,000,000 board feet in sawtimber and 492,000 cords vs. 738,000 cords, following fairly closely the ratio of softwood to hardwood stands. However, it should be noted that white pine appears to be losing ground.

It should not be assumed that lumbering is no longer important. Pursuant to a law enacted in 1925, the yearly cut of lumber is carefully reported, and this aggregate report, summarized for the 17-year period ending with 1941, showed a total output of 3,219,474,000 board feet, or a yearly average of 189,000,000 board feet. More impressive, when the hurricane compelled increased cutting to salvage damaged trees, the cut jumped to 603,259,000 board feet in 1939, the highest production since 1907. Under the stimulus of war demands the annual drain of sawtimber has remained high.

In 1944 the lumber cut was 356,509,000 board feet but the sawtimber drain was 429,330,000 board feet. Three-fourths of this was softwood. Pole-size timber cut amounted to 559,126 cords, of which 370,398 cords was hardwood. The largest use in pole-size timber was for fuel, with pulpwood next. Thus it appears that sawtimber drain is only slightly greater than growth, while cordwood is growing twice as fast as it is being cut.

There is, however, scant ground for complacency, for both growth and harvest should be considerably greater than they are. It has been argued, of course, that these forests would have no higher value as playgrounds

under intensive management than they do at present. Yet they would produce more salable wood, and fully as much of watershed protection, wildlife, recreation and spiritual uplift. As they stand now there is waste of growing capacity which should be abhorrent to realistic and practical people.

State forestry, organized in 1939, is a function of the five-member Forest and Recreation Commission. A considerable body of laws has been enacted. There are also six active district forest advisory boards, representing respectively: Belknap-Carroll; Cheshire-Sullivan; Coos, Grafton; Hillsborough-Merrimack; Rockingham-Strafford counties. These groups have formulated and are sponsoring before the legislature a bill calculated to reduce destruction of immature sawtimber and to promote prompt reproduction of tree growth, after logging.

There is widespread concern over the effects of property taxes on forest land. Two preferential tax statutes offer relief to woodland planters and owners of land bearing young growth, and a still more comprehensive proposal is being pushed. The fact that few landowners seek the benefits of existing laws indicates at least that taxes are not regarded as burdensome by all forest property holders.

Fire protection and the never ending fight against insects are capably administered. Half the cost is borne by the towns, while the state provides correlation and necessary overhead services, including detection. In northern New Hampshire an association of timberland owners carries on organized patrol during periods of high fire hazard, in cooperation with and under supervision of the state forester.

Long accustomed to combatting brown-tail and gypsy moths, foresters and timber owners now have increased worries over the menace of the spruce budworm and birch borers from Canada. Beech is dying in northern New England from scale. Possibly the most significant feature to be emphasized in connection with such threats is the fact that much of such losses can be forestalled by sensible forest management.

The state forestry department would like to see a great awakening of public and private interest in forest management, but this is slow in coming. Private woodland owners speak bitterly of unscrupulous sawmill men who buy their trees for lump sums and butcher them indiscriminately. Frequently similar com-

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FORESTRY: Problem or Opportunity

By WILLIS M. BAKER

"Woodman, spare that tree!" has been the theme of forestry in this country for a long time—in fact, for too long. Just sparing trees will not assure an abundant supply of forest products. Something positive and constructive must be added, if we would advance real forest development. We should no longer be content to appraise progress chiefly in terms of public appropriations for combatting forest depletion.

The American Forestry Association has proposed a national program of forestry which "rests upon the conviction that improved forest management, particularly in the production of commercial crops of wood, must stem chiefly from the initiative of enlightened private ownership . . ." This is an encouraging indication that some of our forestry thinking is maturing beyond the spare-the-tree stage. All of us should recognize the opportunities for advancing timber production by methods which enlist the full support and active participation of forest owners and operators who still control 75 percent of the nation's commercial woodlands.

That this proposal is in any way unique in the development of an American institution is both startling and significant. Yet it does actually represent a drastic reversal of the basic concept of American forestry.

For more than half a century efforts have been made to sell forestry to the people of this country primarily as a problem of stopping forest depletion, and often with major emphasis on public ownership or control as a solution. In comparison, the efforts to develop private forest production by woodland owners, timber operators and industries have been relatively minor and ineffective in most instances. It has been as though the nation were preparing for war by storing up reserves of supplies but neglected to develop any armed forces beyond the small regular army. In other words, the traditional approach to forestry has been chiefly negative; most of the effort has been against

devastation rather than *for* development.

The public control aspect of this program has appealed to some farsighted people concerned about future supplies of timber, but it has aroused little enthusiasm among most of the private owners and operators of some 400 million acres of woodland who are interested chiefly in their opportunities now for growing or utilizing forest products. As a consequence, they appear to have developed the attitude that if forestry is just another problem, let the government solve it! Many have supported the public program, but relatively few have taken any direct action to develop their own forest properties under sustained-yield management.

This attitude is not surprising under the circumstances. Yet it must change, because the continued development and progress of this country are dependent in large measure upon an abundance of forest products as well as upon watershed protection benefits and other services which thrifty woodlands yield. These products and services cannot be realized unless the owners and operators of all forest lands participate actively in a program to keep them fully productive. Obviously, the time has come to develop effective methods for advancing good forestry practices on private lands. This need is generally recognized, but what such a program entails may not be equally well understood.

In some quarters there is still too little realization of the necessity for national leadership and policy which inspire the confidence, respect, good will and the united support of all concerned with forest development and utilization—woodland owners, timber operators, forest industries and public agencies at all levels of government. All must pull together to achieve the objectives of a national forestry program.

The proposal for greatly increased emphasis on private forestry implies no criticism of the public forest program as it has been conducted for the past 50 years. Anyone who understands the forest conditions of this country as they existed at the start of the present century must admire the able and courageous leadership of our early foresters and the

public-spirited citizens who supported them. Their success in establishing an extensive system of national and state forests was the first effective, large-scale effort to check the excessive exploitation of the nation's forest resources. The organizations which they established to provide forest protection have made slow but steady progress.

Such efforts as they made to promote private forestry were not equally successful, partly because of many obstacles and unfavorable conditions beyond their control. But on the whole they tackled a tough job with little support, and they did it well. They had to fight constantly against public apathy and indifference. They had to work against the delusion of inexhaustible resources which even now still exists in some quarters. It is little wonder that they developed negative techniques which usually characterize the defensive position of those fighting against rather than for something.

Since many of the early foresters received their professional training abroad or were taught European methods in this country, it is also understandable how certain European precedents of public control came to be followed here. To be sure, our foresters made no conscious effort to adopt foreign policies based upon an economy of scarcity, but they naturally sought the only experience available as the starting point for American forestry. Perhaps the trouble is that too many of us have remained unaware of trends that have developed and continued from this beginning. Some may have been slow to recognize that changing conditions call for new tactics based upon a positive, constructive approach, with much more emphasis on the part which responsible private citizens must play in the development of democratic processes.

Dr. Wilson Compton, former secretary and manager of the National Lumber Manufacturers Association, stated the situation very clearly in a speech at Duke University in 1942 when he said: "In this country with its abundant forest resources we do not need to follow the parsimonious pattern of European forestry; and the sooner we stop treating forestry

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THE AUTHOR, a keen student of American forestry, is director of the Forestry Relations Department, Tennessee Valley Authority.

KNOWING YOUR TREES

SHELLBARK HICKORY

Carya laciniosa (Michx. f.) Loud.

By WARREN D. BRUSH

Shellbark hickory resembles shagbark hickory but there are distinct differences in leaves, fruit, twigs and bark by which it can be identified. It grows in a much more restricted range than that occupied by shagbark, extending from central New York west through southern Michigan to southeastern Iowa and southeastern Nebraska, and south to northeastern Texas and Alabama. More distinctly a tree of the bottomlands, it is sometimes called bottom shellbark. It often occurs in nearly pure groves, or mixed with other bottomland hardwoods on areas which are inundated during high water. It is also known as bigleaf shagbark and kingnut.

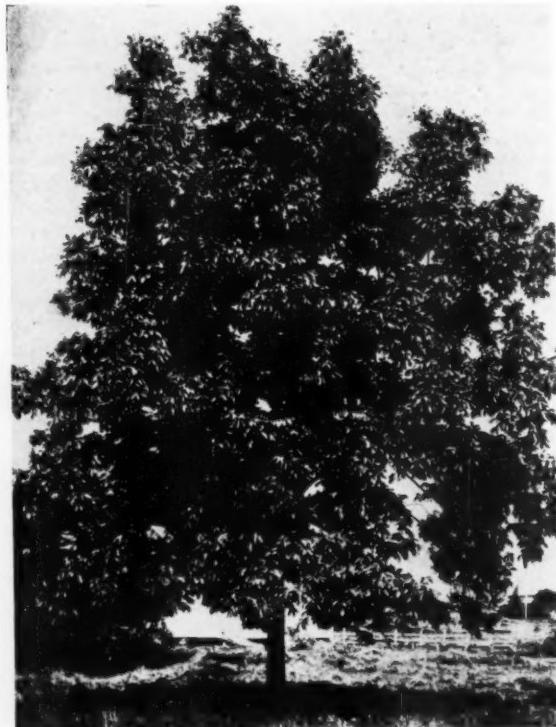
Occasionally attaining a height of 120 feet, its straight slender trunk rarely exceeds three feet in diameter and is often free of branches for more than half its height. The spreading branches form a narrow, oblong head. When grown in the open it develops a more or less egg-shaped crown with drooping lower branches.

The stout, orange-brown twigs are at first covered with fine hairs but later become nearly smooth. The large terminal buds, three-fourths to one inch long, are covered with six to eight dark brown, loosely-fitting scales.

The compound leaves are 15 to 22 inches long with five to nine (usually seven) finely-toothed leaflets. The terminal leaflet, five to nine inches long and three to five inches wide, is usually larger than the others. Dark green and lustrous on the upper surface, they are pale yellow-green to yellowish brown and velvety below. A striking feature of shellbark hickory is the presence of old leaf stalks upon the twigs of the previous summer's growth.

In May, the pollen-bearing flowers appear in catkins five to eight inches long and the pistillate in two to five flowered spikes. The fruit is one and three-fourths to two and a half inches long and is borne solitary or in pairs. The orange to chestnut-brown husk, one-fourth to one-half inch thick, completely separates into four sections. A distinguishing feature is the large nut which is usually oblong and much flattened, one and a fourth to two and a fourth inches long, and one and a half to one and three-fourths of an inch wide, with four or sometimes six prominent ridges and a stout, long point at the base. The thick-shelled nut contains a sweet edible kernel.

The trunk is covered with shaggy gray bark much like that of shagbark hickory but the long thick plates



U. S. Forest Service

Occasionally attaining a height of 120 feet, the slender trunk of Shellbark Hickory rarely exceeds three feet in diameter. Open grown trees develop more or less egg-shaped crowns with drooping lower branches.



L. W. Brownell

usually are less curved. The wood is similar to that of the other commercially important hickories (except the pecans) but is not quite so heavy, a cubic foot of air-dry wood weighing 48 pounds. The heartwood is reddish brown and the sapwood white. The wood is very strong, hard and stiff and exceedingly high in shock resistance. These properties adapt it for handles of striking tools; about 80 percent of the hickory used in manufacture goes into these products. Ladder rungs scythe snaths, gymnastic bars and skis are commonly made of hickory because they require a wood with a high degree of strength, stiffness and toughness. Hickory is one of the best woods for fuel and for smoking meats.

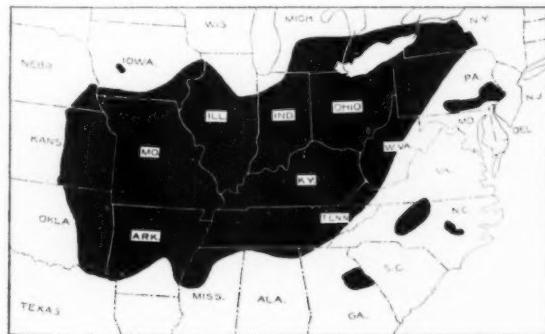
The total stand of the true hickories in the United States is estimated as 6,677,000,000 board feet. The cut has decreased greatly in recent years because of diminished supplies (particularly north of the Ohio and Potomac rivers) and the substitution of steel, especially for automobile spokes and other vehicle parts. The average annual production of hickory lumber is now about 60,000,000 board feet. In addition, much hickory is cut for fuel and large quantities of logs are shipped directly to factories where handles and other hickory products are made. In 1940 more than 75,000,000 board feet of hickory was used in manufacture. The total annual cut for all purposes has been estimated at 120,000,000 board feet.

Shellbark hickory, like other hickories, is slow-growing; it reproduces readily, however, both from seed and sprout. Seed crops are fairly abundant, and although much is appropriated by rodents and man, many of the nuts are overlooked and serve to reproduce the species. It is difficult to transplant because of its long tap root. Growing on bottomlands and along streams, its location protects it from serious fire injury. The tree is often seriously injured by insects, particularly the hickory bark beetle. The logs are subject to attack by a number of wood-boring beetles, and the sapwood, even after it has been seasoned and manufactured into various products, is still liable to damage from powder post beetles.

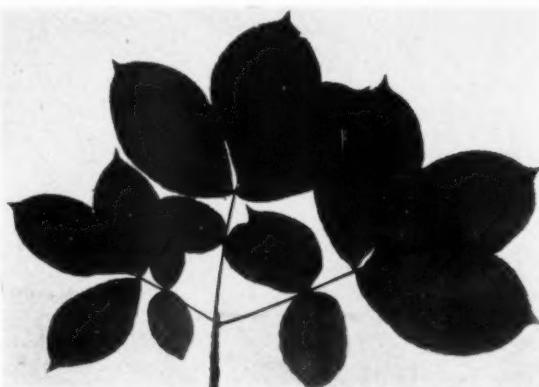
Stout orange-brown twigs bear large terminal buds, often one inch long



L. W. Brownell



Distinctly a tree of the bottomlands, it often occurs in nearly pure groves on areas inundated during floods



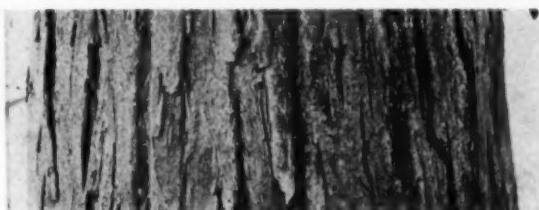
L. W. Brownell
The compound leaves, 15 to 20 inches long, are dark green above, yellow to brownish and velvety below



L. W. Brownell
Pollen-bearing catkins, five to eight inches long, and short pistillate flower spikes appear in May



L. W. Brownell
An orange to chestnut brown husk, one-fourth to one-half inch thick, covers the thick-shelled nut



Penna. Dept. Forests and Waters
The trunk is covered with shaggy gray bark similar to shagbark hickory, but the plates are less curved

AFA Program Presented to INCODEL

ANY educational program designed to implant the principles of good forestry in the minds of American citizens should begin in the schools with the use of forestry primers and be kept alive thereafter by organizations and agencies equipped to "sell forestry" to the adult public, Joseph F. Kaylor, assistant executive director of the American Forestry Association, told a town meeting of the Interstate Commission on the Delaware River Basin at Shawnee-on-Delaware on July 17.

In an address that stressed the key importance of education in promoting The American Forestry Association's Program for American Forestry, Mr. Kaylor praised INCODEL for its enlightened management of the Delaware River Basin. This management, he said, recognizes that the area is largely dependent on forest cover in upland regions to maintain an adequate water supply. Mr. Kaylor said that INCODEL is admirably equipped to initiate its own program in forest resource management by

virtue of its farsightedness, know-how and ability to bring together all related agencies.

The need for such programs is urgent, Mr. Kaylor said. Fully 90 percent of the owners of "small forest properties do not know how to manage their own croplands today and need technical assistance," Mr. Kaylor declared. And the Forest Resource Appraisal, the forerunner of the Program for American Forestry, not only showed that the need for action is urgent but that the American public is "eager and ready" for such action.

There are certain founding principles of good forestry that form the keystone of the AFA Program for American Forestry, the most important being that of informing the average citizen about forestry and why it is important, Mr. Kaylor said. Forest lands must be protected from fire, insects and diseases, he continued. Technical assistance must be furnished to owners of small forest properties. Hundreds of thousands of

acres of unproductive land that are now producing nothing should be reforested. And finally, more timber must be produced from existing stands through the development of better cutting methods and the elimination of destructive practices—something that applies to the woods as well as the sawmill, Mr. Kaylor said, adding that the job may require concerted public action in the development of rules of forest practice to put forest lands on a paying basis. Some states have already experimented successfully with such regulations.

Mr. Kaylor told his audience it would readily understand that any program so far-reaching as the one proposed would require cooperation from all federal, state and local agencies to avoid duplicate wastage of funds and valuable time. Another need is the development of leadership—"the type of leadership that you men have shown here today in holding this excellent forum on soils and forests," Mr. Kaylor said.

State Foresters Elect New Officers

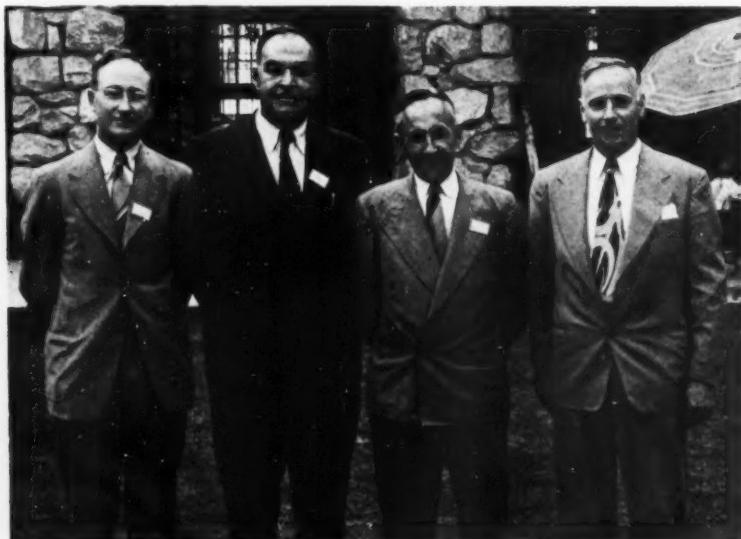
CHARLES H. FLORY, state forester of South Carolina, was elected president of the Association of State Foresters, meeting in Yosemite National Park, California, June 16 to 19. He succeeds Ralph F. Wilcox of Indiana. Other officers elected were Stanley

Fontanna of Michigan, vice-president, A. Raymond Kienholz of Connecticut, secretary-treasurer, and N. S. Rogers of Oregon, to succeed George O. White of Missouri, as a member of the executive committee.

Action taken by the state foresters

endorsed The American Forestry Association's Program for American Forestry (see July issue); favored increase in the Norris-Doxey farm forestry funds to \$1,000,000; restoration of the Forest Survey fund to budget figures; and closest possible cooperation between agencies handling farm forestry matters to avoid duplication of effort. A proposal instructing the new officers to draft a bill enabling U. S. Department of Agriculture-state forestry cooperative forest management projects was approved.

Among the speakers addressing the conference were General H. H. Arnold, former chief of the Army Air Forces, now retired; W. S. Rosecrans, president of The American Forestry Association and chairman of the California State Board of Forestry; General Warren T. Hannum, director of the California Department of Natural Resources; Dr. Stephen N. Wyckoff, director of the California Forest and Range Experiment Station; R. E. McArdle, assistant chief, state and private forestry, U. S. Forest Service; W. R. Schofield, secretary-manager, California Forest Protective Association; Ernest L. Kolbe, forest engineer of the Western Pine Association; and Dr. William R. VanDersal, regional chief of operations, U. S. Soil Conservation Service.



New officers—left to right, Stanley Fontanna, Michigan, vice-president; A. Raymond Kienholz, Connecticut, secretary-treasurer; Charles H. Flory, South Carolina, president; Ralph F. Wilcox, Indiana, retiring president, ex-officio member of executive committee

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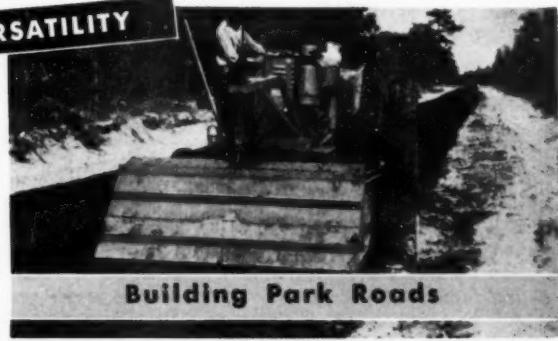
Portability plus is one reason for the Motorized SEAMAN'S popularity in forest fire line construction. Even the largest motorized model (6 feet wide) can be towed at high speed by a pick-up truck, — and at the scene it's ready for towing by any average farm tractor.



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WOODLANDS

A page dedicated to the management of woodlands, large and small—practical suggestions in procedure and technique and in the solution of problems on the ground.

What is your problem? American Forests will assist you in finding an answer. Address queries to The Woodlands Editor.

TWO GENERATIONS OF WHITE PINE MANAGEMENT

Like father, like son, is true on this Vermont farm where forestry was started 33 years ago

The town of Barnet, Vermont, is gently rolling country with at least two-thirds of its area covered with forests of white pine and hardwood.

Thirty-three years ago, Wilbur Nelson, a farmer, who owned about 400 acres in Barnet departed from the usual practice of clear-cutting his woodland and followed the advice of the state forester, Austin F. Hawes. About half of Wilbur Nelson's farm was in woodland. But 50 acres of it was a very dense stand of 40-year-old white pine and hemlock. Here, the trees were relatively small for their age. They were not good crop trees as they stood. They were slow-growing and crowded. State Forester Hawes suggested a thinning, to give the better trees a chance to grow, and marked the trees which should come out.

During the marking and the subsequent thinning, Nelson's five-year-old son, Paul, looked on with considerable interest—an interest which over the years has developed into an understanding and appreciation of practical forestry. At the time of the thinning, however, the economic practicability of the cutting was difficult to see. The small logs harvested at that time barely paid for the cost of the job.

But as young Paul grew, so did the

trees. Then the white pine blister rust entered the stand and, before the disease could be arrested, it was necessary to remove about 8,000 board feet of dead and dying trees. This was in the winter of 1937-38 and was the first cutting made since the original thinning in 1914. The stand is now relatively safe from blister rust—both the cultivated and wild currant and gooseberry bushes, the alternate hosts of the disease, have been removed by repeated scouting of the area around Barnet.

A salvage harvest was necessary again in the winter of 1938-39, following the New England hurricane which blew down 46,000 board feet of salvageable logs. Another 3,000 board feet was salvaged the following year.

In the meantime young Paul had graduated from college, served as a foreman in a CCC camp and had become the owner of the Nelson Farm, Hillside Acres.

By 1942, Paul Nelson believed that the 50-acre stand was ready for harvesting. He planned to cut only the larger trees and to plant young ones in their places. However, after he had cut two acres on this basis, the results looked about the same as a clear-cutting. Surely this area needed special treatment. He cut off the remain-

ing small trees in the two acres and replanted with white pine. In his own opinion he had spoiled two acres, even though he had harvested 104 thousand board feet.

Being supervisor of the local Soil Conservation District, Paul Nelson knew where to go for the answer to his problem of how to harvest this forest. He called in Paul Reed, a farm forester employed cooperatively by the U. S. Forest Service and the Vermont Forest Service under the Norris-Doxey Act. Reed suggested the harvesting of the stand in two operations.

White pine, he explained, does not come in on an area which has been clear-cut unless there is a good seed source nearby, and even then the site may be taken over by hardwoods and brush. To provide the best chances for the area to remain in white pine, it is necessary to have an abundant seed supply and to retain an over-story of older pines to protect the seedlings while they are being established. For that reason, Forester Reed suggested that Paul Nelson open up the stand by taking out a large volume of mature trees. This would create openings in the forest so that the young pines could be established. The remaining trees would be the cone-bearers during this period. Because the object of the method was to make possible the reproduction of

(Turn to page 381)

In the past decade this 50-acre pine forest has yielded 390,000 board feet of timber from salvage cutting and thinning. The 132-foot barn, built of material from the woodland, is shown at left



Whole Timber Crop Utilization

"If we can accept today's markets as indicative of future trends, our experiments leading to whole crop utilization will soon progress from the pilot plant to the new plant and product stage. Basic timber products such as lumber, pulp and plywood will be augmented and perhaps supplanted to a degree by new products from growth now poorly utilized or wasted."

WEYERHAEUSER TIMBER COMPANY
1946 Annual Report

During 1946, two Weyerhaeuser mills produced 4.6 per cent more lumber than in 1945 with 3 per cent less log scale wood usage. In the same period, the company's two pulp mills maintained production at the 1945 level with 4 per cent less logs. A new plant to convert Douglas Fir bark into usable profitable products was put into operation last year. Thus we move toward greater and better usage of our forest crop.

It is estimated that whole timber crop utilization of Weyerhaeuser's potential annual harvest could double the sales value of its usable forest products. This would require use of tops, thinnings, partially rotten wood for which markets are not now available. Obviously, this would require substantial capital investments and tremendous sales effort.

Funds reserved for postwar plant development totaled \$20,000,000 at the close of 1946. These funds will contribute substantially toward steadily approaching the objective of **WHOLE TIMBER CROP UTILIZATION**.

WEYERHAEUSER



Forestry: Problem or Opportunity

(From page 363)

as a perpetual 'emergency,' the more progress we will make in forest conservation. Forestry should be a promise, not a threat. People do not grow or invest in things they are afraid of or uncertain about. They invest in things they have faith in. American forestry needs less agitation and more silviculture."

The truth of these words should be recognized, for they provide the key that will open the door to nationwide forest development. "Forestry should be a promise, not a threat. People . . . invest in things they have faith in." Leaders in public thought and action have the opportunity to help develop this faith in timber production, if the right methods are used. It is known that the values of thrifty forests are very real and benefit everyone in many ways. There is enough factual information to convince most people, if it is used effectively. Finally, it is fully realized that an adequate national program

can be achieved only with the whole-hearted support and active participation of more woodland owners and timber operators. Now is the time to go to work on this basis.

It is only fair to recognize that here and there throughout the country some foresters and forestry organizations have been working along the lines suggested by Dr. Compton, and with good results. Also, there have been many recent indications of increased interest in this approach, especially within the timber industry. But when the actual total effective effort in this direction is compared with what needs to be done, it is still much too little and is starting very late. Progress will be made when there is greater realization that private forestry has now become the real spearhead of the national program.

More than a decade of experience in the Tennessee Valley has convinced TVA foresters, and those of cooperat-

ing state and local agencies, that a very large part of a necessary forestry program can be accomplished by forest owners and timber operators with appropriate public assistance. They are equally convinced that it can't be done without them, except under dictatorial methods. It is recognized that progress may be slow and difficult at first, but it will also be enduring, and once well started, it will carry forward under its own power at a constantly increasing momentum.

The program now proposed by The American Forestry Association, based on "the initiative of enlightened private ownership" with public support, provides the opportunity for concerted, nation-wide action. Woodland owners, timber operators, and forest industries, working with the assistance and cooperation of public agencies at all levels of government, can solve most of the forestry problems by developing fully their forestry opportunities.

Harvard Models

(From page 358)

ting, a profound change had come over the land. The population of Petersham had reached its highest point (double what it is today), and fully 60 percent of the land was under some form of agricultural use as farmers strained to wrest crops from the stubborn and rocky soil. This single glimpse into the past speaks eloquently for the hardihood of the New England race.

Twenty years later the reaction had made itself felt. The Golden West was calling and new industries in the towns were bustling with opportunity. Petersham, passed up by the railways, was losing her young men; and this trend was soon to be accelerated by the Civil War. Field after field and farm after farm was abandoned.

In the meantime the forest, once pushed back to the steepest slopes and rockiest soils, was gaining ground. Trees, especially white pine, began to seed into the old fields, and form the basis of a valuable lumber crop.

Another scene shows this crop being harvested at the height of the logging industry in Massachusetts in 1910. Contrary to most other states, this reached its greatest expansion well after the advent of agriculture instead of before.

The historical series closes with two models portraying the replacement of the pine stands by hardwoods, and the growth of the latter into that bewildering pattern of species, types, and age classes which forms so much of the charm of the New England forest today.

Those interested in woodland management will find valuable another series of models illustrating the cutting practices developed on the Harvard Forest for the purpose of producing maximum yields of high quality timber. The forest, put under intensive management in 1907, is among the oldest of its type in the country. The knowledge thus accumulated and demonstrated is of great import to the science of forestry. The forest contains approximately 2,300 acres in Petersham and 130 in outlying tracts.

Because of widespread interest in land use, several miscellaneous models have been added dealing with various phases of this problem. One concerns the importance of forests as a source of food and shelter for wildlife. Especially emphasized is the value of small, continuous silvicultural operations carried on so as to give the needed variety within the

radius of the daily movements of the animals. Game management is of such great significance because hunting and nature study have become major activities of American life.

Accelerated erosion is the subject of another model wherein the insidious effects of washing soil are pictured. This process is of such widespread occurrence that no one can escape the evil results.

Two more models are concerned with the subject of fires. Their disastrous effect upon the forest trees is illustrated, and modern methods of detecting and combatting them are dramatically and forcefully displayed.

In the mezzanine above the models is a partially completed exhibit of general forestry intended to amplify the display below. Cases are devoted to various operations of forest management and phases of forest ecology.

The Fisher Museum occupies the whole of an attractive building just north of Petersham village on Route 32, halfway between the railroad towns of Barre and Athol, and near the Quabbin Reservoir. The interest of the museum and the beauty of the countryside make a combination that no one should miss.



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Los Angeles	—	867,600
Minneapolis	—	1,600,530
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New York	—	50,000
Omaha	1,064,900	1,843,200
Philadelphia	—	1,170,000
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CONSERVATION IN Congress

By A. C. Hall

THE first major piece of forestry legislation to pass the 80th Congress is S. 597, introduced by Senator Bushfield of South Dakota. This bill, authorizing the Secretary of Agriculture to cooperate with state and private landowners in controlling destructive forest insects and diseases, became Public Law No. 110 on June 25. The Act carries no appropriation, but is enabling legislation under which the Secretary of Agriculture may expend funds as may be later appropriated to prevent, retard, control or suppress insect and disease pests on all forest lands. Before such work may be done on other than federal lands, the Secretary is directed to require contributions in the form of funds, services, materials or otherwise from the state or private owners.

The Department of the Interior Appropriations Bill, H.R. 3123, as passed by the Senate on June 16 made a number of increases over the amounts passed by the House. The bill is now in conference. The Senate increased by \$505,440 the amount allowed by the House for the Fish and Wildlife Service, but cut the overall amount for the National Park Service by \$136,200. The major reduction in park funds was \$500,000 from the House allowance for roads, trails and physical improvements, but increases of \$287,000 for national park administration and \$63,400 for recreational areas were made. While increasing the funds for the Bureau of Land Management by \$458,940, the Senate retained the House restrictions on the funds for administration of the Taylor Grazing Lands, but restored \$25,000 for the operation of the Squaw Butte experimental station in Oregon. It restored in part the funds for fire control in Alaska, which had been eliminated by the House. The Senate also added \$500,000 to the funds for soil and moisture conservation activities of the Department. It reduced the funds for the management of Indian forests and ranges by \$198,500.

The Department of Agriculture

Appropriations Bill, H.R. 2601, was reported by the Senate on July 11, carrying the following increases over the House appropriations: \$20,000 for Bureau of Plant Industry's chestnut diseases and \$100,000 for work on Dutch elm diseases under the Bureau of Entomology and Plant Quarantine. One million dollars was added to the Forest Service appropriation for the following purposes: national forest protection and management, \$250,000 of which \$25,000 is specifically earmarked for the Lake Tahoe recreational area, \$250,000 for forest products research, \$250,000 for the forest survey and \$250,000 for forest land acquisition. Another million dollars was added to the funds for forest development, roads and trails and \$3,000,000 for forest highways. The small increase for disease control for the Bureau of Plant Industry completely ignores, as did the House action, the importance of diseases of young stands and plantings other than chestnut.

Two bills to enlarge the national forests in California have received action. On July 7, the House passed H.R. 2295, introduced by Representative Engle of California, to enlarge the Modoc National Forest. Representative Engle's bill, H.R. 3175 to transfer from the National Park Service to the Forest Service the recreational features of Shasta Dam, was reported favorably by the House Committee on Public Lands (Report N. 680). The Forest Service now has administration of the lands on three sides of the lake and this bill would consolidate the administration of the area under one federal agency.

S. 616, introduced by Senator Maybank of South Carolina, to authorize the establishment of a game refuge on the Francis Marion National Forest in his state, was passed by the Senate on June 23.

The House Committee on Public Lands gave speedy action to a bill to amend the Taylor Grazing Act. H.R. 4079 was introduced by Representative Barrett of Wyoming on July 2

and on July 11 it was reported favorably (Report No. 890). The bill directs the Secretary of the Interior in fixing grazing fees to take into account the extent to which the grazing districts yield public benefits over and above those accruing to the users of the forage resources for livestock purposes.

The Senate Committee on Public Lands reported favorably (Report No. 433) on S.J. Res. 118 on July 3. The resolution, introduced by Senator Butler of Nebraska, authorizes the Forest Service to sell timber growing on any vacant and unappropriated and unpatented lands within the exterior boundaries of the Tongass National Forest in Alaska. It also authorizes the Secretary of the Interior to appraise and sell any such lands as are reasonably necessary in connection with or for the processing of timber from lands within the Tongass Forest. Hearings have been held on a similar resolution, H.J. Res. 205, introduced by Representative Hope of Arkansas.

Another bill for the establishment of a national science foundation was introduced on July 2 by Representative Wolverton of New Jersey. The bill, H.R. 4102, is a companion measure to S. 526 introduced by Senator Smith of New Jersey, et al, and passed by the Senate with amendments on May 20.

The sale of national forest timber without advertisement for use in housing for veterans of World War II would be authorized by S. 1444, introduced by Senator Bridges of New Hampshire on June 13.

Senators Tydings of Maryland and Hickenlooper of Iowa introduced S.J. Res. 142 on July 2 to provide that the President shall call a congress of one delegate from each state to draft and recommend a program for conserving the nation's forest and soil resources. In introducing the bill the senators pointed out that programs to date have been more or less expedient and, though good in part, have not been established on a nation-wide basis.

On June 11, Senator Morse of Oregon introduced S.J. Res. 126 providing for a suitable and adequate system of access roads to and in the national forests for better administration and fire protection. The resolution carries an authorization of \$25,000,000.

Senator Burke of Ohio introduced H.R. 4018 on June 30, to authorize the transfer of federal war properties to the states when such properties can be utilized for wildlife, recrea-

tion, forestry or educational purposes. This is a companion measure to S. 1155 introduced by Senator Wherry of Nebraska on April 22. Hearings have been held on both bills.

Two measures affecting the Olympic National Park were introduced by Representative Mack of Washington on July 1—H.R. 4053, to create a commission on the Olympic National Park similar to that provided for in H.J. Res. 84 introduced by the late Congressman Norman; and H.R. 4054, to transfer certain lands in the park to the Olympic National Forest. This is identical to H.R. 2750 and H.R. 2751.

Another bill for the settlement of Alaska by U. S. veterans is H.R. 4059 introduced by Representative Lemke of North Dakota on July 1. It applies to the national forests and other public lands of Alaska, excluding national parks and monuments, army and navy installations, coal, oil or gas lease lands, airfields, school lands, fish and wildlife reservations and watershed lands, and includes veterans of all U. S. wars. A similar bill, H.R. 4060, was introduced by Representative Penden of Oklahoma on July 1.

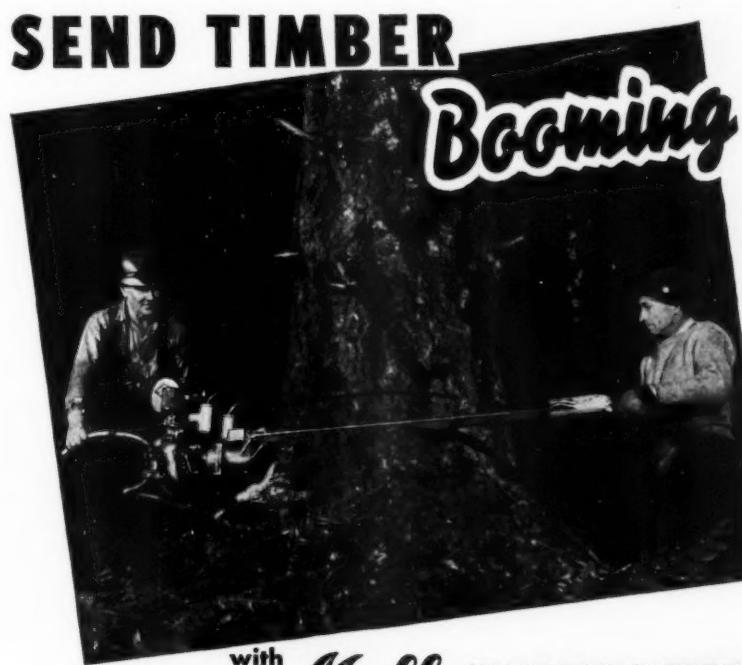
Indiana Competition

THE Indiana Hardwood Lumbermen's Association has provided \$1,000 in prize money to be awarded in January 1948, to woodland owners in the state who score highest in management, protection and utilization of established woodland on the farm; protection against grazing and fire; and tree planting. The contest is being conducted in cooperation with the Indiana Department of Conservation, Division of Forestry, and Purdue University.

Nursery Expanded

A tree crop large enough to restock 15,000 to 20,000 acres of fire-denuded timber land in Oregon and Washington has been started at the Forest Industries Tree Nursery, Nisqually, Washington.

Twelve million tree seeds were planted and by fall the nursery will have produced an estimated eight million seedlings, largest crop in the six-year history of the nursery. The seedlings are to be planted on privately-owned areas in the Douglas fir belt. The areas to be planted have failed to restock naturally because of repeated burnings.



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8-47

French Government Honors American Foresters

FOUR American foresters were honored by the French Government on June 26 for their efforts to form an international forestry unit within the United Nations. Henry Solon Graves of New Haven, Connecticut, one of the world's most distinguished foresters, and Lyle Watts, chief of the U. S. Forest Service, were awarded the rank of *Officer du Merite Agricole*. Tom Gill, secretary of the Charles Lathrop Pack Forestry Foundation, and Edward Kotok, assistant chief of the U. S. Forest Serv-

unexploited forests, which will meet in Geneva in August.

Chief Forester Watts not only served on the original Technical Forestry Committee, but at subsequent annual conferences of FAO and on the organization's Standing Advisory Committee on Forestry, of which he has just been elected chairman. Mr. Kotok is also a member of the Standing Advisory Committee and chairman of its subcommittee on forest research. He participated in the first and second annual Conferences on



Honored by the French Government. Left to right, Edward Kotok, Tom Gill, Lyle Watts, Henry S. Graves—and Bernard Dufay, who came to Washington from France to make the awards

ice in charge of research, were honored with the grade of *Chevalier* in the order of *Merit Agricole*. The awards were made at a ceremony at the French Embassy in Washington by Bernard Dufay, chief of France's Department of Waters and Forests.

All four of the honored foresters served as members of the original Technical Forestry Committee of the Interim Commission on Food and Agriculture set up in 1944 under the chairmanship of Mr. Graves.

Mr. Graves later acted as chairman and Mr. Gill as secretary of the Forestry Committee at the First International Conference on Food and Agriculture, held in Quebec in 1945, at which the United Nations Food and Agriculture Organization was formally established. Mr. Gill is also a member of the FAO's Standing Advisory Committee for Forestry, and is chairman of its subcommittee on

Food and Agriculture, and has only recently returned from Marianske Lazne, Czechoslovakia, where he served as American representative to the International Timber Conference.

In bestowing the order of *Officer du Merite Agricole* on Mr. Graves, who has served American forestry in many capacities, including chief forester of the United States, dean of the Yale Forest School and president of The American Forestry Association, Mr. Dufay said: "For us in France, the tribute we pay Dean Graves is clearly merited because the work Dean Graves has done is well known in my country. He served in France during the first World War as commander of the American foresters who came over to liberate France at that time. But we in France also know Dean Graves as one of the foremost foresters of our age. We know

that he has been one of the first chiefs of the Forest Service of the United States. . . . We know that he built the famous forestry school at Yale, and we know of the important scientific contributions he has made

to silviculture. Finally, we have followed with keen interest the documents which were produced by the United Nations Interim Commission under the chairmanship of Dean Graves."

Granite State Woodlands

(From page 362)

plaints are levelled at pulpwood "jobbers." Yet few such owners are willing to mark trees for sale or supervise cutting to protect their own interests.

Since 1939 on a small scale and throughout the state since 1945, county forestry work has been carried on among owners, chiefly farmers. This is conducted by pooling resources made available by state, the counties and the University Extension Service, in cooperation with the federal government under the Norris-Doxey Act. Seven men, during the past two years, have marked, supervised cutting and assisted in marketing suitable trees from many thousands of acres, leaving well stocked woodlands. Such assistance promises rapid improvement among forest owners.

Large private timber companies have employed foresters for many years, with good results. The great need is for expansion of technical

services to small owners, not only farmers but others. There are a few private consulting forestry services in the state. One of the newest and most interesting is the Peterboro Center of the New England Forestry Foundation. Its highly practical demonstrations of management are attracting wide attention, and many owners have retained the agency's services. The state forester follows the policy of recommending consulting foresters to owners willing to pay for such work.

Presumably there are other needed answers to New Hampshire's forest problems. Among these are: use for waste products; closer understanding with timber processors regarding the advantages of using large material; better manufacture and grading of products; marketing services to woodland owners. The state forestry department hopes to take a leading part in finding these answers and others not mentioned here.



Our New Catalogue

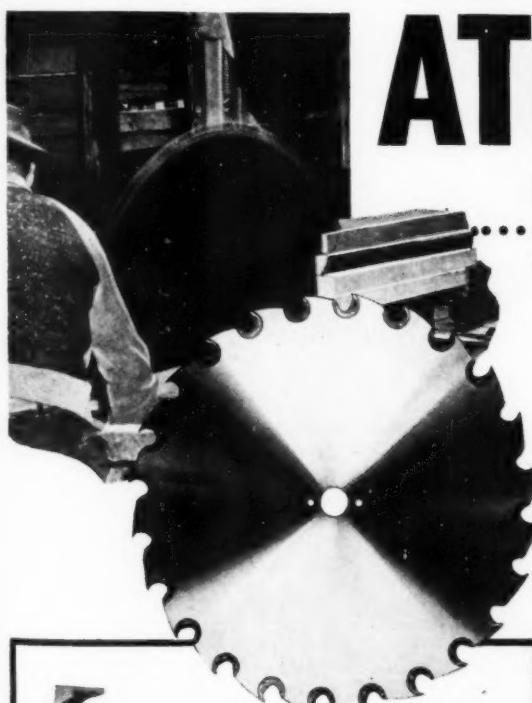
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OUR RURAL COMMUNITIES, by LaVerne Burchfield. Published by the Public Administration Service, Chicago, Ill. 201 pages. Price \$2.50.

Aware that cultural and recreational opportunities in rural communities have failed to keep pace with urban development due to limited financial resources and facilities, Miss Burchfield in her factual monograph has undertaken to outline the major problems confronting rural areas today including the problems of welfare, schools, recreation, land use, housing, medical care and health services and many others.

Miss Burchfield does not attempt to present any program of action but her competent presentation of rural problems should be of value to individuals and groups contemplating such action. Her reportorial account is also an excellent guide to a very considerable body of literature that has grown up around these problems.

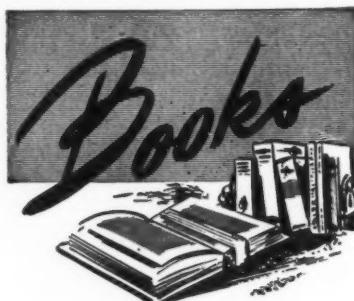
The idea for this book originated in the work of a committee of the American Country Life Association which prepared a brief digest describing activities of agencies interested in country life. Later it was decided to expand the digest and Miss Burchfield, research associate on the staff of the Rural Education Project, was requested to make the revision.

HUNTING NORTH AMERICAN DEER, by Arthur H. Carhart. Published by the Macmillan Company, New York. 232 pages, illus. Price \$2.49.

Seventeen interest-packed chapters will help the sportsman follow the game trails of the muleys, the whitetails and the black-tails. The author is an experienced hunter and former coordinator of federal aid in wildlife restoration in Colorado. A chapter on guns describes every type of rifle from the old .30-.30 to the now popular .270. Other chapters discuss the still hunt, the stalk and the drive; how to hunt alone and with groups, plans for trips, special equipment, how to transport meat in good condition and how to recognize an exceptional trophy.

FIELD BOOK OF EASTERN BIRDS, by Leon A. Hausman. Published by G. P. Putnam's Sons, New York City. 659 pages, illus. Price \$3.75.

This handy compact volume has been prepared to help those who are interested in identifying birds—either about the home, in the fields and woods, in the mountains and along the shores—indigenous to the territory east of the Mississippi River



and the west shore of Hudson Bay.

Each bird is fully described in simple terms and illustrated by a line drawing. Its characteristics have been carefully worked out, making field identification a simple and enjoyable hobby, as well as serving as an accurate basis for the study of bird life.

SPRAY CHEMICALS AND APPLICATION EQUIPMENT, by J. A. McClintonck and Wayne B. Fisher. Published by Horticultural Press, Waddell Printing Co., LaGrange, Indiana. 320 pages, illus. Price \$4.00.

A practical guide on the insecticide-fungicide industry, this book is the result of six years of research and collection of data. It is easy to read and understand. Part I gives interesting historical background of many chemicals and detailed discussions and photographs showing how they are manufactured, methods of using spray chemicals for insect and disease control, and methods of improving control practices. Part II describes almost every type of sprayer and duster available to the public, ranging from the simplest atomizer to the largest commercial sprayers and dusting equipment.

THE PAN AMERICAN YEARBOOK—1945. Compiled and published by Pan American Associates, 1150 Sixth Avenue, New York. 829 pages, illus. Price \$5.00.

This is the first practical reference book of essential information about the Americas. Arranged in three parts, the yearbook covers general information on the geography, governments, transportation, people, economy, education and culture of the various countries; a chapter on each country, including a full-page map, map of all major cities, brief statistical survey, bibliography, and details on history, populations, official trade controls; and a who's who of Inter-American Trade, listing more than 25,000 firms and representatives.

The publications listed below must be ordered direct from the addresses as given and not through the Association.

Calculating the Growth of Ponderosa Pine Forests, by Philip A. Briegeb, Pac. N.W. For. Expt. Sta., 423 U. S. Court House, Portland 5, Ore.

The Mahogany Book, by George N. Lamb. Published by the Mahogany Association, Inc., 75 East Wacker Drive, Chicago 1, Ill.

The Yale Forest in Tolland and Windham Counties, Connecticut. By Walter H. Meyer and Basil A. Plusnini. Published by the Yale University School of Forestry, New Haven, Conn. Price \$1.00.

Annual Report of the State Forester. State Forestry Department, Dover, Del.

The A B C's of Public Relations for Recreation. Published by National Recreation Association, 315 Fourth Ave., New York 10, N. Y. Price 85 cents.

Use and Abuse of Wood in House Construction, by R. P. A. Johnson and E. M. Davis. Misc. Pub. 358, For. Serv., U.S.D.A. Supt. of Docs., Wash., D. C. Price 10 cents. **New York State Ranger School, Wanakena**—Announcement of courses. Published by The New York State College of Forestry at Syracuse University, Syracuse 10, N. Y.

Report of the State Commission of Forestry, by Charles H. Flory, State Forester. State Commission of Forestry, Columbia, S. C. **Resin Adhesives and the New Plywood Program**, by Thomas D. Perry. Chemurgic Reprint Series No. 4, and *Babacu—The Wonder Tree*. Chemurgic Reprint Series No. 5, reprinted from The Chemurgic Digest, Phila., Pa. Price 25 cents each.

Overstocking Trout Streams, by Thomas K. Chamberlain and *Research In Stream Management in the Pisgah National Forest*, by Thomas K. Chamberlain, U. S. Dept. of the Int., Fish and Wildlife Service. Reprinted from Transactions of the Eighth North American Wildlife Conference, 1943. American Wildlife Institute, Investment Bldg., Washington, D. C.

Canker Stain of Planetrees, by James M. Walter. Circ. No. 742, U. S. Dept. Agr. Supt. of Docs., Wash., D. C. Price 5 cents.

Flora of Grandfather Mountain, by Harlan P. Kelsey. Published by the National Parks Association, 1214 16th Street, N. W., Washington 6, D. C.

A Banker Looks at Forestry

(From page 346)

valuable in the making of similar loans on farm woodlands. The relatively costly investigations that are frequently required by public agencies could be reduced to a minimum. Because of the leading position which he often occupies, the country banker could also be an effective force in the promotion of better farm-woodland use. This approach has been successfully tested in the case of soil-conservation problems.

"Forest financing by commercial banks has such obvious advantages that it is incumbent on these lenders to expand their activities in the field. Country bankers particularly have not only an opportunity to obtain these advantages for themselves and their communities but a responsibility to do so. In view of the farm woodlands' economic possibilities under sustained-yield management the legal restrictions on private lending that are based on traditional concepts need to be re-examined. Commercial banks have a vital interest in obtaining an early reconsideration and revision of present lending restrictions on timberlands."

There is no doubt that the bankers of the nation can be of great assistance in educating the public to a finer appreciation of forestry. However, the story must be gotten over to them in a forceful manner.

The plan of banker participation in forestry education has been put over in the writer's community with outstanding success. The region is one of the best slash pine producing areas in the South, but it also has the poorest stand of timber of any county in this section of Florida. This condition is due largely to the fact that it has always been an open cattle range county, and annually 75 percent of the forest area is burned over. For years efforts have been made to pass a "no fence" law (outlawing the open range), but public opinion was not back of it and no progress could be made.

Five years ago the writer served on a committee to obtain public support for such a law. Within a few months all of the directors and officers of the banks in his community were sold on the idea, and through them other business leaders were interested. The

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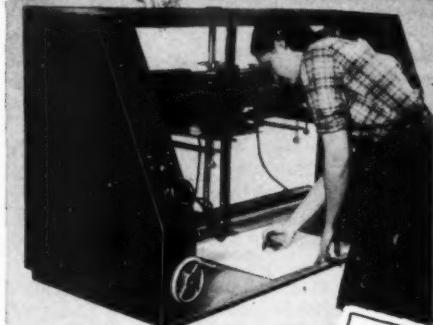
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first step was to hold an election for county-wide fire control. This was passed by a five-to-one vote in 1944. Early this year the Junior Chamber of Commerce conducted a straw ballot of the registered voters of the county asking the question "Do you favor a county-wide 'no fence' law?" The result was a six-to-one affirmative vote. A bill was prepared and the local county representatives introduced it in the State Legislature in April and secured its passage. The county-wide referendum will take place in October and it is a foregone conclusion that it will carry by a large majority.

The landowners of this county will

now be in position to carry out their plans of reforestation. Land buyers for pulp mills and other forest interests are checking prices and otherwise indicating their interest in the forest lands of the county. It will not be many years until the 300 thousand acres of the county's cut-over and burned-over forest lands will be back into production.

This same result can be accomplished in many areas all over the nation if the local bankers will indicate their interest and back up civic groups who are desirous and eager to work for the progress of their community, but need the backing and encouragement of influential citizens.

Whitebark Pine (From page 351)

Mountain gales may flatten the tree from infancy, or the winds may be resisted for many years before overthrowing the tree. In either case, whether winds triumph early or late, the end result is similar for the prostrate tree; the numerous, short, thick-set trunks sprawl along the ground and send up dense branches which the winds keep closely cropped.

Seldom do trees attain a better "streamlined" shape. The most perfectly streamlined are those clumps which crouch in the lee of protecting rocks. Each winter sees the new shoots, which in a more genial season have grown beyond the rock's shelter, trimmed away by the cutting blasts. Where the prostrate trees grow abundantly on exposed slopes, a type of "forest" is formed, on top of which it would be an easy matter to walk.

When fortune smiles upon whitebark pine, it grows upright to maturity. Upright trees are found in the areas of maximum shelter. Sometimes many separate, short, erect trunks are formed, and it is difficult to be sure one is dealing with an individual tree. To judge from the ground surface, the trunks do not seem to be joined, but below it they may spring from the same root system.

In some instances a series of these trunks stand in a row athwart the wind, forming what John Muir called "a harp for the winds." From this harp comes almost continuous pine music, for wind, the musician, is tireless. Sometimes a number of erect trunks may be joined near the base, and one to several individual trees may be involved. Near Mono Pass in Yosemite National Park, is one such tree (or trees?); about six large trunks are fused into a common base which has a diameter of 10 feet.

The shape of the branchlets in

whitebark pine is peculiar. Each branchlet consists of a series of oval to spherical swollen portions (joints), due to thickenings in the primary bark. Each thickening is separated from its neighbor by a constriction. Both in size and form the leafless portion of such a branchlet resembles a chain of beads. Each "bead" represents a complete season's growth in length; thus seven beads within an inch would represent seven years' growth within this length, a not unusual situation. Such branchlets also can be found in other timberline coniferous trees of slow growth, but they are best developed in the whitebark pine.

Of all the pines native to North America, whitebark alone possesses a cone which after ripening ultimately falls to pieces. It is generally useless to hunt for them under a tree; all one finds are cone scales and cone cores scattered over the ground. The whitebark is like the true fir in this respect, although, of course, there is only the most remote relationship between them. This remarkable disintegration of the cones is a rare feature in pines. In fact, it is found in only two other species. One, the Swiss stone pine, is native only to high mountains in Switzerland, northeastern Russia, and Siberia; the other, Korean pine, is found only in the mountains of northeastern Asia. The seeds of these three pines are completely wingless, another character they share in common and apart from other pines.

The close resemblance in cones and seeds of these three species is not accidental. Rather, it means that these pines, however isolated they are from one another today, shared a common ancestry in the remote past, and had a common place of origin from which they subsequently migrated. We can

turn to a bird to lend weight to this argument.

Generally associated with these three species of pines are one or another species of nutcrackers; in fact, the total world range of the nutcrackers is more or less coincident, especially during the breeding season, with the range of these pines. The cry of the Clark's Crow nutcracker, so familiar to those who travel among whitebark pines, is little different from the cry of the nutcracker which greets the Alpine traveler in Europe. The very frequent association of these birds with the disintegrating cone pines of timberline is an association which may have its roots in a lengthy and common history and interdependence between bird and tree.

The nutcrackers utilize these pines for their food supply, and where the disintegrating cone pines grow, the nutcrackers live and thrive. In the Sierra the Clark nutcracker harvests probably at least 75 percent of each season's crop of whitebark pine seeds. Perhaps on this basis he should be classified as an enemy of the tree, but in his greed he inadvertently scatters a few seeds here and there, and thus assists in spreading them, a task for which whitebark is poorly equipped because of its wingless seeds which the wind cannot aid in carrying.

Few trees are more tenacious of life than the whitebark pine. An individual tree may be blown down, over half of it may already have been long dead, yet the prostrate trunk develops a new thicket of branches and holds on to life for uncounted years more. Little is known of the tree's maximum age, yet it is obvious that it must run into centuries. Growth, especially in the more exposed localities, is extremely slow. This can be seen by examining the cut surface of a branchlet with a hand lens. The annual rings on such a surface frequently show 40 years of growth in a diameter of three-sixteenths of an inch. John Muir counted 75 annual rings on a branchlet scarcely one-eighth inch in diameter. This means that it took about 75 years for the branchlet to add one-sixteenth of an inch to the diameter of its wood! Yet, this is a not unplausible record for whitebark pine.

Snugly settled beneath his whitebark-bough shelter amid the Sierra peaks, the camper is in a world apart. The landscape is suffused with the magic of alpenglow. Mountain peaks vanish and in their place the night overhead is filled with millions of stars. The night sky dominates the world—the world of whitebark pine—at timberline.



A NEW FLAG IS FLYING

August, month of especial peril in the forest states, greets a new battle flag atop fire hall masts in Western Washington.

A white triangle, bordered by angry red flame licking at a vivid green outline of the State of Washington, is the battle flag of forest fire preventers and fighters in the Evergreen State.

Just as weather flags warn seafarers of storms ahead, so these new banners of the Keep Washington Green Association rise to fly whenever extreme hazards threaten wooded areas.

Storm warnings suggest staying close to shore, out of the wind, anchor at the bottom. Fire warnings suggest anchoring all inflammables far away from the forests.

A vigilant public, alerted to fire dangers through these new flying flags, is the only force which can stop searing flames before they start.

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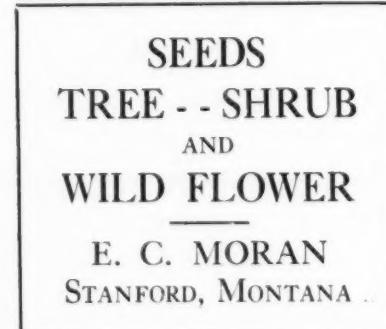
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Air-Herding the Pronghorn

(From page 349)

turned as a unit, to once again seek escape at the far end.

Now they were not rushing, but seeking, sniffing, looking for a way out. At last the young leader broke toward the corral and the herd followed at his heels. When the last animal was in, a concealed crewman leaped to his feet and jerked a cord that closed the big swinging gates—and we had 38 fine, healthy animals in the corral.

Around the trap they dashed, occasionally throwing themselves at the netting only to be tossed unharmed to the ground by the heavy cord. Then, using canvas to haze them, we tried time after time to force the animals into the catching pen. But they continually broke through or jumped the canvas.

Finally 10 were cut away, forced into the squeeze pen and then into quarters so close they couldn't run. These comprised the first group to be loaded.

Most of the crew had handled wild game, ridden broncs, and faced their country's enemies, but there was something formidable about the back-curved sharpness of a buck antelope's horns and the straight dagger-like points of a doe's. After some debate and planning, three men entered and "ganged up" on a large male for the first victim. It was soon found that one man could handle an antelope by flanking it and getting its feet off the ground. As each animal was caught, it was removed through a sliding door, weighed, ear-tagged, and placed in a specially built truck bed. This truck, with a four-foot roofed over-rack, two partitions and the deck covered with sand and straw, was soon loaded with 17 antelope, including does, bucks and young in the accepted proportion.

Two of us, having previously examined and approved one of the areas selected for transplanting, climbed into the truck and started toward our destination, about 150 miles away. Occasional glances into a peephole in the truck cab revealed that our passengers had settled down and with ears erect and eyes bright appeared to be enjoying the trip.

At our destination in the lush grass of the prairie range, we backed against a square bank and removed the endgate. The animals glanced around quickly to make certain they were free, poured from the truck, took a few short hops and broke into a trot. In a matter of seconds the first load

designated for this area was streaking across the prairie. As the waning rays of the afternoon sun reflected from the white "heliograph" rump patches of the herd (which was now examining its new home range), we visualized the herd of the future, trotting airily over the prairie and providing thrills for wildlife enthusiasts in this area where nothing but jackrabbits had lived before.

Since this initial trapping operation, the technique has been perfected and modified in many ways. Metal posts and cables replace the old heavy wooden posts and eliminate slow and costly digging operations. This portable trap has been erected by five men in five and one-half hours, including the wings. The largest herd captured consisted of 203 animals, and this in less than 15 minutes of flying. However, the nature of wild game makes every operation a new and exciting adventure and one particularly stubborn band required four hours of hazing to get in the trap.

Almost 1000 pronghorns have been re-established in areas where they once abounded but had been decimated by man's thoughtlessness. The continuation of this program may in time bring the pronghorns back to all of their former range.

In its native habitat—the rolling plains—the pronghorn is a graceful, swift, and ever interesting occupant. Being most prolific of the big game species, it can rapidly repopulate its depleted ranks if given half a chance. However, its curiosity is a well known trait that is often used by hunters and many animals have fallen victims to such a simple ruse as a waving red bandana or a slightly moving sombrero.

Historical information places the original number of antelope as paralleling, if not exceeding, the buffalo population. The original range is said to have extended from Mexico into Canada and from the Pacific almost to the Mississippi.

These tremendous numbers were so reduced by civilization's inroads that at the turn of the century, antelope were in a position considered critical by wildlife authorities. However, under the protection of sanctuaries, game laws and a changed attitude among the people, the pronghorn has increased favorably. Today, although the range is reduced to about one-third of its former size, there are about 200 thousand of this species.

Man and antelope have managed

to get along fairly well, since the latter is primarily a resident of the rolling plains and seldom gets into agricultural areas.

The airy elegance of its gait, its unique and attractive coloration, and its childlike curiosity make the pronghorn antelope a favorite with all who know and love the prairie region. Certainly this aristocrat of the plains deserves to become better known and more firmly entrenched in his preferred habitat among the grasses and sagebrush of his native West.

Woodlands

(From page 368)

the pine without encouraging hardwoods and without having to resort ultimately to planting. Reed called the first cuttings, "reproduction cuttings."

These reproduction cuttings were started in 1943 and were completed in the winter of 1946-47. In that period, 163 thousand board feet were harvested. The work is going slowly because Paul Nelson is doing it all by himself as part of the farm management.

Before the reproduction cutting was started, however, the dairy barn on the Nelson farm together with stock and equipment was lost in a fire. Building materials being scarce during the war, Nelson would have been unable to rebuild if it had not been for his 50 acres of pine. From it he harvested enough material to construct a new, modern barn 132 feet long and 38 feet wide.

So far, the 50 acres of timber, first thinned in 1914 has yielded a total of 390 thousand board feet through salvage cuttings and thinnings. The remaining trees are loaded with cones that will shed seed this fall. When the new seedling trees are well established, Paul Nelson will harvest the remaining 795,000 board feet of timber in the old stand.

And to keep the stand coming along for his son, Paul Nelson has now to guard against fire on his 50 acres, against the pales weevil in the early years and the white pine weevil later on. Of course, he'll have to continue his vigilant reduction of currants and gooseberries to protect his stand from the blister rust. Later on it may be necessary for him to follow in the footsteps of his father and thin out the crowded young stand. But unlike his father, Paul Nelson will not be breaking any precedents by these measures. He will be following the forestry pattern established on Hillside Acres over the past 33 years.

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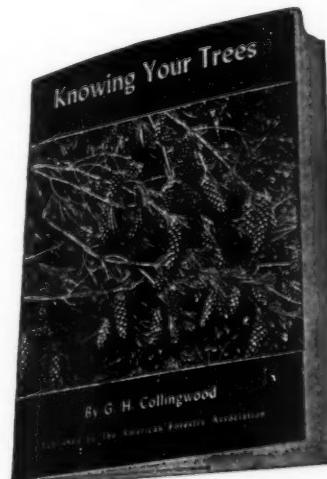
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Progressive Forest Farming

(From page 356)

are other profitable farm enterprises. All are managed for best yields, and they earn good returns. Many another farmer in this situation would go all-out for the crops and livestock, and let the woods grow "wild," figuring his management efforts should be centered on the fields. But the Webbs have a broad viewpoint; they seek the views of research workers and specialists. They study trends. They keep books on cost and returns. They conclude, "timber, from the standpoint of costs and returns, is the most profitable crop we grow. It is also invaluable to a balanced, year-round farm program. We expect our timber crop to become relatively more important in the future. Cotton, livestock, and potatoes can be produced in abundance in many places, but not timber."

Throughout middle and south Alabama, county agents can name dozens of large plantation-type holdings that are pointing for a timber program similar to the Webbs. Even if they do not have good cropland and grasslands for intensive agricultural operations, there is the idea of the "woods

tenant." He might help to replace the familiar, South-wide cotton tenant who too often does little good for himself, the landlord, or the general economy. There could be a small subsistence type farmstead, and year-round woods work for the head of the household. Many plantation-size tracts from one end of the southern forest to the other seem to invite such a development. The woods need constant cutting of small-size trees and the poorer large trees, for improvement. Markets for small trees, and attractive prices, have come to much of the region.

The Webb's are performing an outstanding public service through the demonstration value of their timber operations. After seeing their work, another plantation owner has few arguments left. He may say, "They have a lot of merchantable timber, and my lands are cutover." Time and growth will remedy that, aided of course by fire control, improvement cuttings, and perhaps some planting.

Plantations comprise a giant portion of the South's woodlands. While nobody loses money by holding lands in the pine country, at the same time, these places have not been doing too well generally—at least not for the tenants, the lands, and the local economy. Integrated yearly forestry is just beginning to be recognized as a good bet to put them on their feet. People are accustomed to see some owners spend money by the thousands of dollars to develop beef cattle, dairy-ing, pecans, or what-not. Sometimes their ventures fail but the owners are not deterred. They continue to seek the satisfactions that go with successful farming. They want to be doers, not merely owners. They can hardly fail with a timber program. Leaders of forestry education have a challenge to arouse their interest. Arrival of the Norris-Doxey and other extension foresters now serving about half of the counties in the southern pine region is already a potent factor. Fire protection has been gaining. Fire protection and marketing assistance now comprise 95 percent of the publicly supported forestry program. Neither one does much for the scrubby or unstocked woods. To overcome this problem, and it is a serious one in this area, investment of effort and money seems necessary. To induce owners to make this investment despite the long-term feature of the enterprise—that is a final mountain to be scaled.

Financial Statement

The American Forestry Association

BALANCE SHEET AS OF MAY 31, 1947

ASSETS	LIABILITIES AND SURPLUS
Cash	\$32,599.42
Accounts Receivable	5,391.38
Accrued Interest Receivable	797.68
Inventories	11,430.47
Deferred Charges	1,377.70
Endowment Fund (Including Real Estate)	300,472.37
Furniture and Equipment	1,335.85
TOTAL	\$353,404.87
	TOTAL
	\$353,404.87

INCOME AND EXPENSE ACCOUNT FOR THE SEVENTEEN MONTH PERIOD ENDING MAY 31, 1947*

EXPENSE	INCOME
General Administration	\$51,675.01
American Forests Magazine	81,869.56
Membership	31,824.93
Educational Publicity	6,796.63
Forester's Office	6,370.68
TOTAL	\$178,536.81
	TOTAL
	\$178,536.81

*On January 28, 1946 the Directors changed the fiscal year from December 31 to May 31. Therefore a statement for seventeen months, January 1, 1946 to May 31, 1947 is presented.

Wood Waste

(From page 347)

ethyl (grain) alcohol from wood waste. The cellulose is converted by hydrolysis into sugar, which, in turn, is fermented by yeast to produce alcohol. A ton of dry wood will yield about 1,100 pounds of sugar, and a residue of approximately 600 pounds of lignin. The fermentable sugar will produce, under average conditions, from 55 to 65 gallons of 95-percent alcohol. The sugar can be used to grow a yeast of high protein content for livestock fodder.

The United States produced 566 million gallons of ethyl alcohol in 1944, chiefly from grain and molasses. If it becomes economically feasible to produce all this alcohol from wood, and if a substantial market could be developed for wood sugar and fodder yeast, several hundred million cubic feet of waste might be utilized each year.

Chemists have produced many products from lignin, but its commercial possibilities have not been fully explored. Millions of tons of lignin are wasted annually in the cooking liquor of pulp mills, and large quantities will become available if the new ethyl alcohol industry becomes widely established. Profitable use of lignin may be an important factor determining whether ethyl alcohol can be produced economically from wood.

The problem of lignin use may be solved if its value as a soil-amending agent or fertilizer is proved. It should improve the physical structure of many soils. An organic material, it

undoubtedly contains many elements essential to plant growth.

Research is encouraging integration of wood-using industries. Thus, the by-product of one plant may become the raw material for another. A handicap to integrated operation is the distance between the plants. Waste material usually cannot be transported long distances because of the cost. Grouping of industries helps to reduce waste and permits better utilization of raw materials. For example, a sawmill might send selected logs to a veneer mill or cooperage plant, and knotty, defective logs to a chemical plant. It might sell sawdust or slabs to a lath or wood flour mill, pulp mill, or alcohol plant.

A step further in this direction is the conversion of single-product industries to multiple-product industries. Examples of this type of operation exist in combinations of sawmills with veneer and plywood plants, pulp mills, box plants, and furniture factories.

Research has done much toward the reduction of wood waste, but much remains to be done. Many products and processes are still in an experimental stage, some cannot be produced profitably and most of them require specialized knowledge. Keen competition will exist in the production and marketing of products which prove their worth. The advantage lies with manufacturers who are making related products and who have equipment and skilled labor at hand.

Donkey

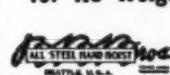
(From page 352)

and our food includes dehydrated vegetables and soups, powdered milk, puddings, eggs, and coffee. To save weight we put much of our food in cloth bags.

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must be loaded and unloaded each day you travel. At lower elevations if there are bears around, food must be slung in the kyacks from a high limb of a tree. In thunderstorms your equipment must be kept dry or

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later dried out. So, on the whole, you will find it less burdensome to limit yourself to necessities.

2. Do not plan too long or ambitious a trip, counting on making time to complete it. A donkey's best speed is less than two miles an hour. We have found that once a day's travel has begun, it is best to travel steadily except for a lunch stop.

3. Sierra donkeys are trained to lead, but those of our experience have always traveled just as well when out on the trail—and certainly with less effort on our part—with one of us merely walking in front and the other behind. The end of the lead rope should then be tied to the pack in such a way that it can be released quickly in case you meet a pack train of mules and horses which has the right of way.

4. Be sure your pack is correctly balanced. For this purpose a spring scale weighing to 50 pounds is almost essential. If the kyacks and dunnage bags on either side of the animal are equal in weight, a multitude of problems never arises. But if the pack is allowed to ride first on one side and then on the other, an animal's back soon becomes sore. What is more, if enough out of balance, it will suddenly swing all the way around under the animal. Then the kyacks empty their contents in the dust of the trail. We have learned at last to pack correctly, but we still carry a good knife in our belt to cut the pack rope free in case of an emergency—for instance, a fall on a precipitous slope or while crossing a swift stream.

5. The saddle cinches should be loose, we have learned, and heaving and pulling saved for tightening the pack rope. If the saddle cinches are too tight, sores result. A back cinch, especially, if too tight cuts off the animal's wind, and he will simply lie down. A properly balanced load rocks equally from side to side and remains securely in place even before the pack rope is tied on.

6. Attention to other details will

help prevent your animals becoming unserviceable from a sore back. Dust the granite sand out of his coat before packing. Be sure that the blankets are free of wrinkles. After placing the saddle, lift the blankets slightly along the animal's backbone to prevent binding. Before fastening the saddle cinches, tilt the saddle slightly to the right. It will then be centered when the cinches are tightened. (All packing is done from the left side.) Put the right-hand loaded kyack on first and support its weight until your partner gets the "ears" of the other kyack looped over the saddle forks. This will prevent twisting of the saddle out of line.

7. Select your campsite so that there is good grazing for your animal. Donkeys seem to prefer parched, brown grass and other dried-up plants to the lush growth of damp meadows. We have always found strayed donkeys, incidentally, on the driest, hottest slope accessible—usually immobile behind a granite boulder and effectively hidden except for two long ears protruding over the top. The lead rope and pack rope tied together can be used for staking out your donkey. We moved our animals to a fresh spot before dark and again the first thing in the morning before getting our own breakfast. In this way, with grazing time at noon, they got plenty to eat.

In the High Sierra there are thousands of miles of good trails. Whether you choose to make a circuit of 100 miles or more, crossing 13,000-foot passes on the way, or whether you plan merely to spend a few days at some off-the-road lake, it can be done with the assistance of a donkey.

We have found them to be faithful carriers of all the things we travelers in the wilderness today cannot get along without. They have added to the interest and enjoyment of all our trips. Somehow they never fail to win one's affection—these oldest of man's beasts of burden—in spite of the attention they require, their idiosyncrasies, and the crises survived together.

AUTHORS

RUTH ELWONGER (*How to Get Along with a Donkey*) of Berkeley, California, writes of one of her chief hobbies, wilderness travel. HENRY S. KERNAN (*Harvard Models*) lives in Oneonta, New York. CHARLES Ross (*Progressive Forest Farming*) is extension forester at Oregon State College, Corvallis. CARL and HELEN SHARSMITH (*Whitebark Pine—Timberline Tree*) are botanists of Minneapolis, Minnesota. KEN THOMPSON (*Air-Herding the Pronghorn*) lives in Helena, Montana. JOHN B. Woods (*Granite State Woodlands*) was director of the Forest Resource Appraisal for The American Forestry Association.



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